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# Birds of the Houtman Abrolhos, Western Australia

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**Abstract**

This paper provides an overview in the form of an annotated list of the 105 species of bird recorded from the Houtman Abrolhos and adjacent seas, comprising 40 seabirds (19 breeding), 42 littoral and lake shoreline birds (six breeding) and 23 land birds (six breeding). In the list we summarise for each species and subspecies its distribution (including extra-limital range), status (whether it is a resident or a breeding or non-breeding visitor, sedentary or migratory or is a vagrant), relative abundance (whether it is very common, moderately common, uncommon, scarce or rare) and its migration and movements. Season of occurrence of regular non-breeding visitors is indicated by months of earliest and latest records and for vagrants and rare visitors' records are individually cited.

## Introduction

In this paper we collate what is known of all birds recorded on or near the Houtman Abrolhos. Where applicable, data are given on distribution (including extra-limital range), status, abundance, season of occurrence, breeding season (defined by the months in which eggs are laid), timing of breeding events, clutch size, nest and food. The terminology used to define habitat preferences of seabirds is inshore, offshore and pelagic, i.e. distinguished roughly by the distance to which they habitually forage out to sea.

## The Environment

The Houtman Abrolhos are an archipelago of 192 islands and rocks lying 60–80 km off the mid-west coast of Western Australia (WA) between

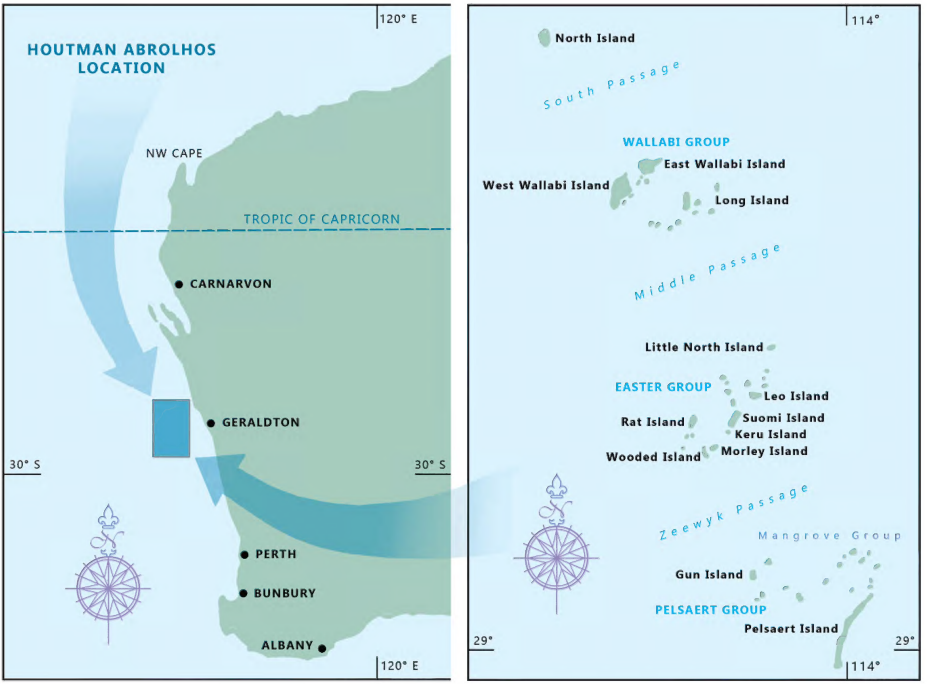


**Figure 1.** Houtman Abrolhos location maps.

latitudes 28°20' and 29°00'S (Fig. 1). They are located towards the edge of the continental shelf and are clustered, from north to south, in four groups: the isolated North Island and the Wallabi, Easter and Pelsaert Groups, each of which rises from a platform 50 m deep (Figs. 2–6). They were separated from the mainland by rising sea level 11,000 to 12,000 years ago (How *et al.* 2020; Abbott & Burbidge 2023). In 1929 the Houtman Abrolhos islands were gazetted as an "A" Class reserve.

Mean annual rainfall is in the order of 300–400 mm, most of it falling from May to September. Due to the offshore southerly Leeuwin Current (Pearce & Cresswell 1985), sea temperatures are markedly higher around the islands than along the adjacent mainland coast.

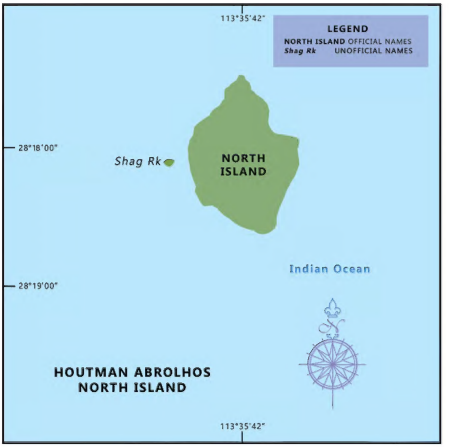


**Figure 2.** Map of North Island, Houtman Abrolhos.

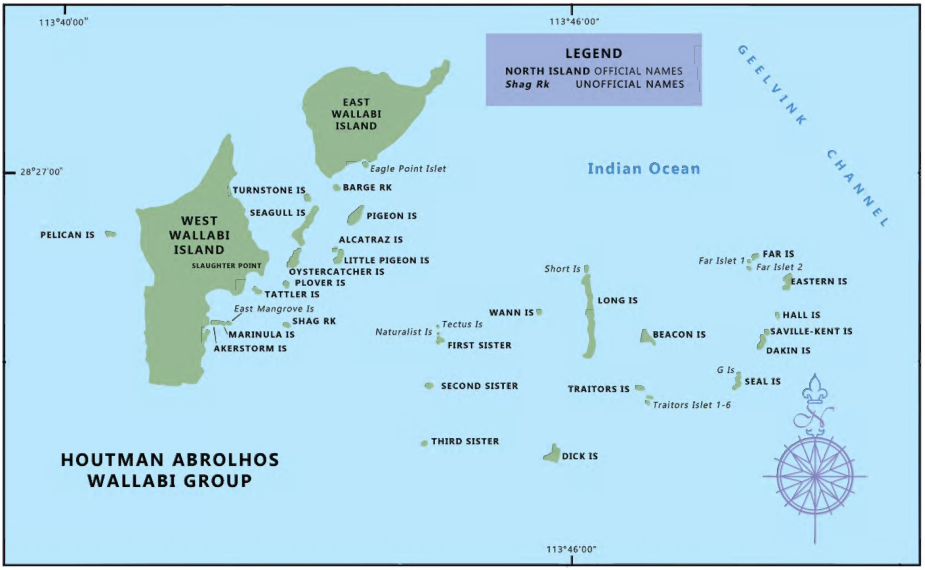


**Figure 3.** Map of Wallabi Group, Houtman Abrolhos.

The higher sea temperatures may also explain how an archipelago with a Mediterranean climate can support a predominantly tropical avifauna and why these islands are surrounded by coral reefs, the most southerly in the Indian Ocean.

The islands (see Appendix 2) range in size from West Wallabi (600 ha) down to rocks a few square metres in area (Figs. 7, 8, 9 and 10). On several of the larger islands there are relictual continental surfaces including dunes and aeolian limestone which retain a moderately rich vegetation. At the other extreme are islands that consist entirely of accumulations of coral debris, cast up by storms from nearby reefs; these islands have little or no vegetation (Fig. 11). The shallow soils over limestone throughout the Abrolhos have a varied assemblage of sclerophyllous shrubs and low trees up to 3 m tall. The vegetation on shell or coral grit islands is lower and less diversified and dominated by halophytes: mainly saltbush *Atriplex* spp., that is replaced in low-lying areas by the samphire *Tecticornia halocnemoides* (Figs. 12, 13, 14 and 15). Sandy areas are dominated by the succulent shrub *Nitraria billardierei* where the soil is shallow, and by the tussock grass *Spinifex longifolius* where it is deep. Stands of the mangrove *Avicennia marina* occur in and around lagoons on Pelsaert, Wooded, Morley, Burnett, Uncle Margie with small stands on Stokes, Gilbert, Alexander and Serventy (Figs. 16, 17 and 18).

## Effects of humans and introduced animals

Lort Stokes named Rat Island in 1840, but the identity of the rodents is unknown. They could possibly have been *Rattus rattus* or *R. norvegicus*, descendants of early shipwrecked

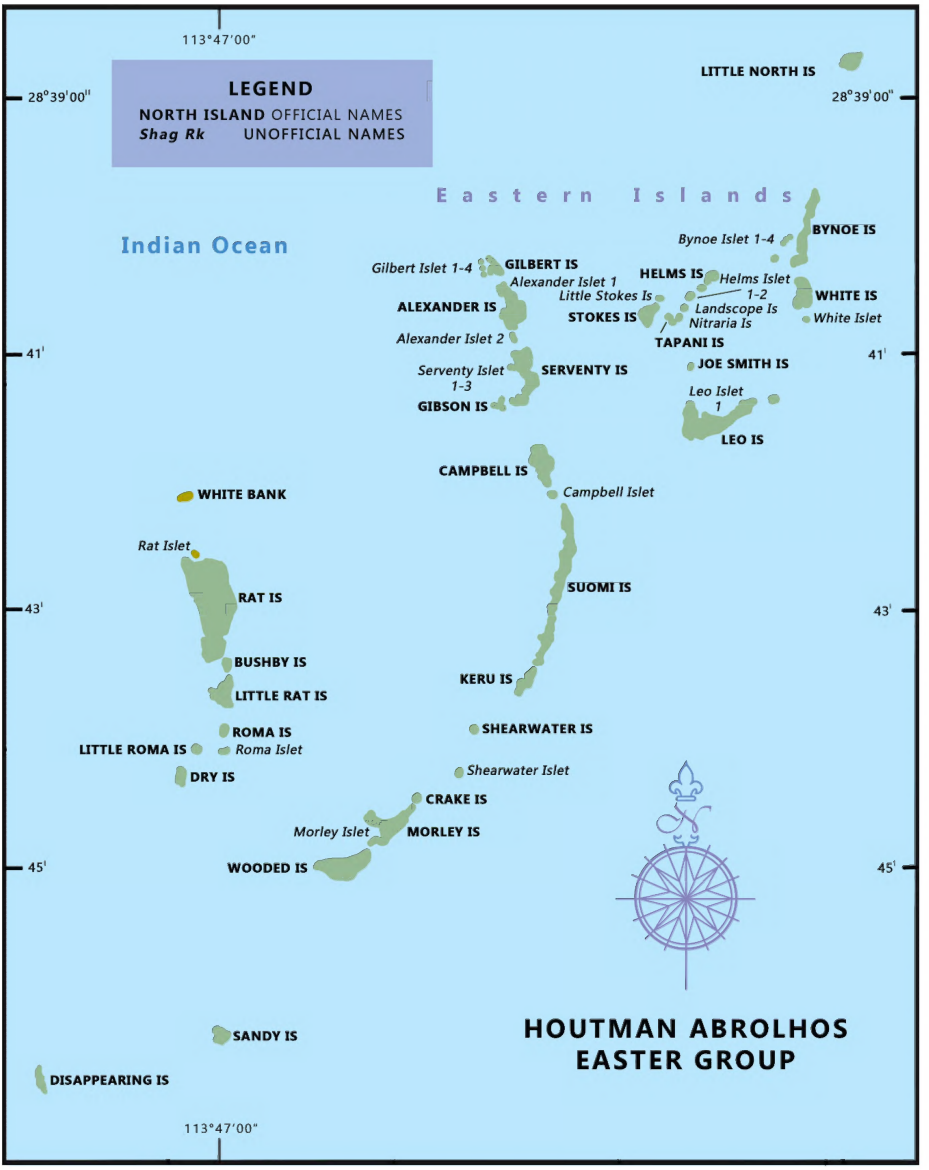


**Figure 4.** Map of Easter Group, Houtman Abrolhos.

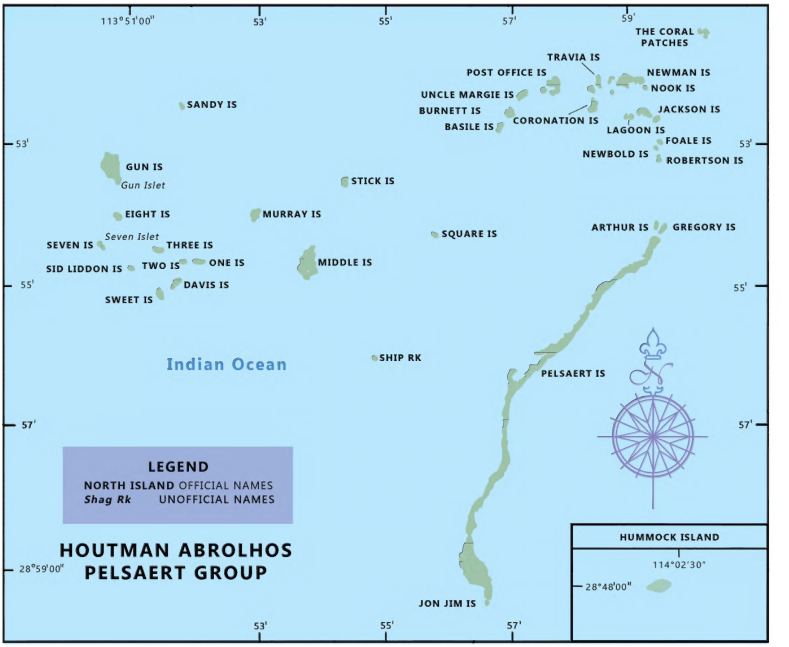


**Figure 5.** Map of Pelsaert Group, Houtman Abrolhos.

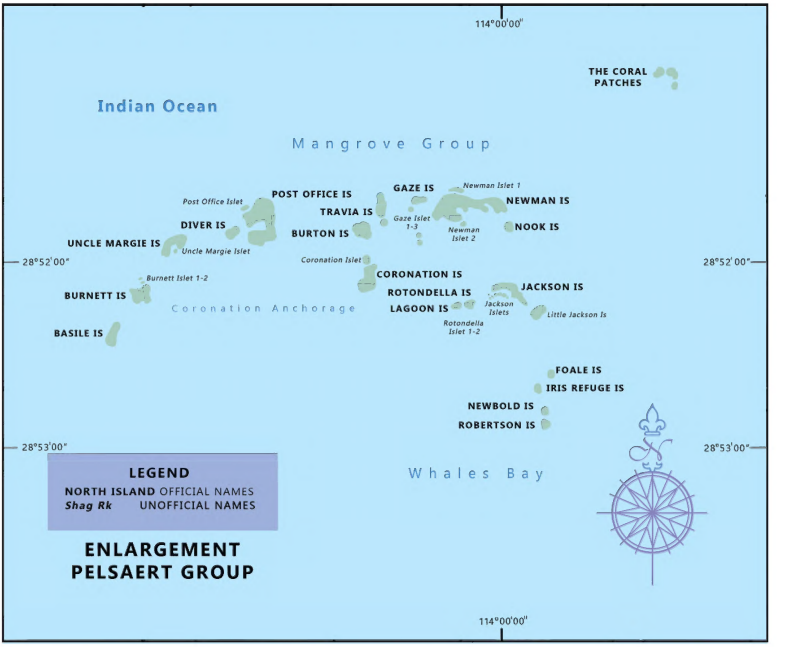


**Figure 6.** Map of Pelsaert (Mangrove) Group, Houtman Abrolhos.

**Figure 7.** Aerial view of West Wallabi Island with Shag Bay in foreground. Photo: I. Brodie.

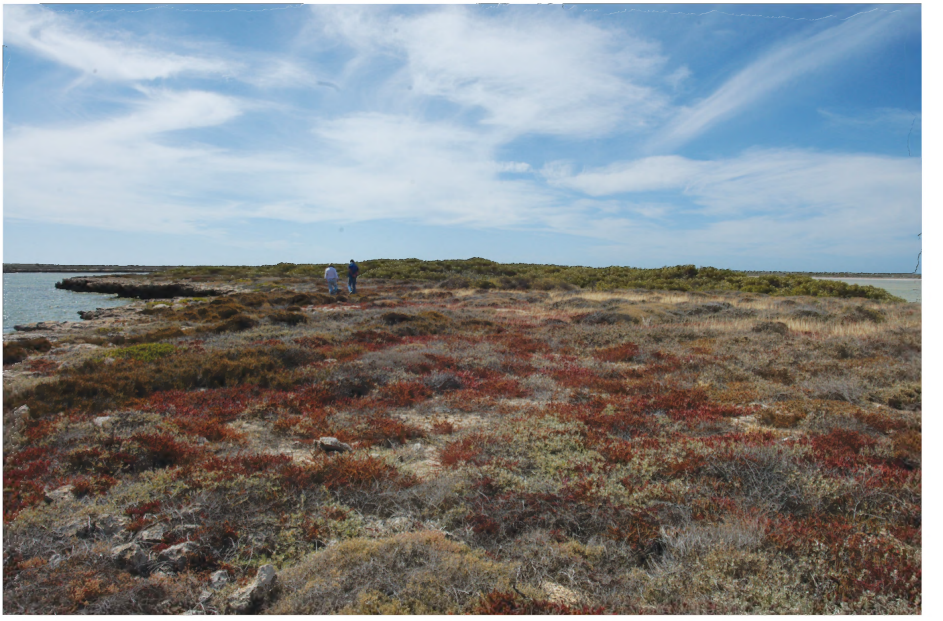

**Figure 8.** Samphire and *Atriplex* on pavement limestone with mangroves in background, West Wallabi Island. Photo: R.E. Johnstone.

**Figure 9.** Limestone islets in the Wallabi Group. Photo: R.E. Johnstone.

**Figure 10.** Shag Rock, Wallabi Group with mostly bare limestone. Photo: R.E. Johnstone.

**Figure 11.** Pavement limestone on Long Island near middle neck. Photo: R.E. Johnstone.

**Figure 12.** Low *Atriplex* and samphire, Wooded Island. Photo: K. Coate.

**Figure 13.** Lagoon with surrounding *Atriplex* and *Nitraria*, Pelsaert Island. Photo: K. Coate.

**Figure 14.** Shrubland of *Nitraria*, Pelsaert Island. Photo: K. Coate.

**Figure 15.** Aerial view of Beacon Island showing patches of vegetation. Photo: I. Brodie.

**Figure 16.** *Avicennia* mangal surrounding Pelsaert Island lagoon. Photo: R.E. Johnstone.

**Figure 17.** *Avicennia* mangal with breeding colony of Lesser Noddy. Photo: K. Coate.

**Figure 18.** Stands of *Nitraria* and *Avicennia* in Easter Group. Photo: W. Millar.

animals. Their effect on the breeding seabirds is also unknown; however, their large numbers did not prevent Rat Island from being an important breeding ground for tropical seabirds.

Guano was mined on several islands, especially Rat and Pelsaert from 1847 to 1946 (Fig. 19) and on Gun Island from 1885 to 1915 (Fig. 20) (Storr *et al.* 1986). According to the account of Stanbury (1980, p. 14): "The collection of guano was relatively simple work. After the stunted scrub had been removed, the guano was shovelled together into piles. Hoes were used to scrape deposits from pockets and hollows in the rocks and these were then swept clean with stiff brooms. The dried guano was then thrown over screens to free it from roots and stones

**Figure 19.** Guano workers, Rat Island 1894. Photo: Battye Library BL1786B_8.

**Figure 20.** Bagging guano, probably Gun Island. Photo: Battye Library BL1133B_76.

and the fine material then loaded into baskets for transport". However, after the removal of vegetation, rocks and soil disturbance, nesting seabirds recolonised areas devoid of vegetation to lay eggs (see Fig. 21). The guano workers collected many eggs for food and introduced the domestic cat on Rat Island for the control of rats. By 1913 the rats were extinct and by 1940 the Common Noddy and Sooty Tern had disappeared from Rat Island and a few years later the Wedge-tailed Shearwater had too (Storr *et al.* 1986). By the late 1980s the cats were living on lizards and house mice (*Mus musculus*).

Rabbits formerly occurred on Pelsaert Island and goats were introduced to East Wallabi Island, but these did not establish and appear to have had no lasting effect. Gun Island was inhabited for nine months by the survivors of the *Zeewyk* shipwreck in 1727 where they no doubt survived partly on eating seabirds. Tammars (*Macropus eugenii*) and rabbits were liberated on North Island as a source of food for any shipwrecked or storm-bound fishermen, but neither species persisted for very long. Commercial harvesting of seabird eggs occurred between the two World Wars and likely

**Figure 21.** Rat Island,1907 showing breeding terns. Photo: C.P. Conigrave, Battye Library BL1786_11.

had an impact on some colonies (Storr & Johnstone 1977).

For several years from 1931, a small lobster (crayfish) canning factory operated six months of each year on West Wallabi Island. Up to 500 cans, each containing two lobsters, were processed daily in a hessian-enclosed factory. Staff lived in tents nearby, varying their diet with seafood, tammar and Muttonbird (Wedge-tailed Shearwater) (*The West Australian*, Perth, 24 February; Cruise of the Silver Gull 1934). After World War II lobster fishing became a major industry that involved hundreds of people and the building of huts, jetties and other installations, most of which could only be occupied during the lobster season from March–June (Fig. 22). Airstrips were built on North, East Wallabi and Rat islands. From 1943 to 1946 the British Phosphate Commission re-established buildings and mined guano on Pelsaert Island. Following the cessation of mining activities in 1946, a tourism venture using the commission buildings for accommodation operated until 1950.

Rabbits were introduced to Leo, Morley and Wooded islands, presumably by fishermen, and were eradicated by poisoning in 1973–1974 (Long 1988), although they were reported absent on Leo Island in 1969 (Surman & Nicholson 2016a). According to local fisherman Leo Antilla, two pairs of rabbits were released on Leo Island in 1971–1972. They bred up to over 100 quite quickly, but by 1981 were extirpated. He also mentioned that rabbits from Leo Island were introduced to Wooded Island (Storr & Johnstone, unpublished data).

**Figure 22.** Fishermen's huts, jetties and other infrastructure. Photo: Photographer unknown.

The *R. rattus* accidentally introduced to Pigeon Island have also been exterminated, however, the house mice established on North Island remain in large numbers.

Tammar wallabys were introduced onto North Island in the 1920s but subsequently died out and more were introduced from East Wallabi in 1985 (Chant 2005) but also were unsuccessful in establishing a population. Another introduction from West Wallabi was unfortunately very successful and by the late 2000s their numbers were in the hundreds and had a devastating impact on the vegetation. A control program was reinstated in 2018 and will continue until the tammar population is eradicated (Carter *et al.* 2022). This introduction has led to the local extinction of the Abrolhos Painted Buttonquail (Barnes *et al.* 2021).

Exotic plants (some 95 species) were inadvertently introduced, mainly via seeds in chaff fed to horses employed by the guano mining industry (Harvey *et al.* 2001). Also, some plant species were introduced by fishermen and around airstrips.

**Sources of data**

The first substantial accounts of the birds of the Abrolhos come from the famous collector-naturalist John Gilbert, who visited Pelsaert, East Wallabi, West Wallabi and a few other islands in January–March 1843 on behalf of John Gould. Gilbert published an account of his visit in a Perth newspaper, most of which was reprinted by Whittell (1942) together with extracts from Gilbert's letters to Gould. Other notes from the trip were published by Gould (1865).

A.J. Campbell visited Rat and Pelsaert islands in December 1889 and his observations and those of G.K. Beddoes (manager of Rat Island guano works) were published by Campbell (1890, 1900). The next were visits by C.P. Conigrave (1916) in 1897 (and presumably also in 1915 with W.J. Dakin), by R. Helms (1902) in 1898, R. Hall (1902) in October 1899 and C.G. Gibson (1908) in November 1907.

Professor W.J. Dakin lead the Percy Sladen Trust Expedition to the Abrolhos in November 1913 and again in October–November 1915 and produced the first detailed accounts of the islands and their fauna. Dakin (1918) wrote the narrative and the descriptions of the islands and the adjacent seas, and W.B. Alexander (1922) published an account of the fauna collected and observed on the expedition (Alexander took part in the 1913 visit).

P.T. Sandland (1937) visited Pelsaert Island in November 1936; V.N. Serventy (1943) made visits to several islands during December–January 1940–1941 and 1941–1942; H.E. Tarr (1949) visited Pelsaert Island in September–October 1948; E.H.M. Ealey (1954) visited the Pelsaert group in August 1953; J. Warham (1956) visited Pelsaert Island in November–December 1954; and G.M. Storr (1960, 1965, 1966) made visits to the Wallabi Group in April, June and September 1959 and April 1960 and North Island in September 1959.

In the 1960s the Aquinas College carried out expeditions to the Wallabi Group in August 1964 and 1965, the Pelsaert Group in August–September 1966 and January 1968, and the Easter and Pelsaert groups in August 1970. Details of these expeditions were published by O'Loughlin (1965, 1966, 1969) and Green (1972).

For the Abrolhos account, extensive unpublished sources of data are from G.M. Storr and R.E. Johnstone (unpublished data). This source has also been cited previously as the "Storr-Johnstone, WA Bird Data Bank" (e.g. Johnstone & Storr 1998, 2004; Johnstone *et al*. 2013). It includes field notes on visits by D.L. Serventy to Pelsaert, Mangrove (Uncle Margie) and Square islands in November 1943, to Pelsaert Island in November 1944, and to North, East Wallabi, West Wallabi, Rat, Morley, Wooded and Pelsaert islands in December 1945. Field notes made by V.N. Serventy, G. Pizzey and A.G. Mathews to several islands in December 1963. D.L. Serventy also gave the authors a copy of the notes he made on photographs taken by the Duke of Edinburgh on a visit to Pelsaert Island on 24 March 1963. C. Surman carried out extensive surveys throughout the archipelago and published detailed accounts of the breeding seabirds (Surman 1994a, 1994b, 1998, 2019 and Surman & Nicholson 2016a, 2016b, 2016c). There were also several unpublished reports, including: Storr & Johnstone (1977), Coate (2005, 2007) and Surman & Nicholson (2009).

**Other sources of information**

Other unpublished data comes from visits by T.C. Allen to Pelsaert Island in September 1961 and November 1964 and to West Wallabi Island in August 1976; G.E. Lodge's visit to Pelsaert Island in August 1963 and the Wallabi Islands in August 1964; N. Kolichis's visits to Pelsaert Island in August and November 1973 and August 1975 and to Wallabi Islands in July 1974, August 1975 and August 1976; P.R. Howden's visit to North Island in September–October 1974; R.I.T. Prince's visit to North Island in August 1976; A.A. Burbidge and P.J. Fuller's visits to Pelsaert Island in October 1977, February 1978 and 1979, November 1980 and February 1981 and 1984 (mostly in Fuller & Burbidge (1981); P. Griffin's visits to the Pelsaert Group in April 1976, 1977, 1978 and April–May 1979; G.J. Robert's visit to several islands in June–July 1980; and P.J. Fuller's visit to Leo Island in February 1981; and correspondence and photographs from visits by J. and B. Fitzhardinge of seabirds from North Island and adjacent seas from the 1990s to mid-2000s.

R.E. Johnstone surveyed islands in August 1977 including Rat, Wooded, Morley and Pelsaert islands; in May 1981 on Basile, Pelsaert, Nook, Jackson and satellites, Wooded, Leo, Gilbert, Alexander, Serventy, Helms, Joe Smith, Dick, Long, Beacon, Pigeon, East Wallabi and North islands; in October 1981 on Pelsaert, North, Pigeon, West Wallabi, East Wallabi, Long, Beacon, Rat, Roma, Serventy, Gibson, Campbell, Suomi, Morley, Wooded, Nook, Jackson and Newman islands; and in August 1983 on Pigeon, West Wallabi and satellites (Johnstone & Storr 1994), Seagull, Barge Rock, Turnstone, Oystercatcher, Lumley, Little Pigeon, Beacon, Long, Dick, Seal, Dakin, Saville-Kent, Hall, Far, Eastern, East Wallabi, North, Rat, Little Rat, Wooded (Johnstone & Coate 1992), Morley (Johnstone 1992), Crake, Shearwater, Keru, Suomi, Roma, Little Roma, Bushby, White, Bynoe, Helms, Stokes and satellites, Gilbert, Alexander, Serventy, Joe Smith, Basile, Burnett, Uncle Margie, Post Office, Coronation, Jackson, Newman, Nook, Square, Middle, Stick, Pelsaert and Hummock islands.

During the latter surveys the Lands and Survey Department approved the naming of 11 previously unnamed islands in honour of the following naturalists: W.B. Alexander, B. Bynoe, A.J. Campbell, W.J. Dakin, C.G. Gibson, J. Gilbert, R. Hall, R. Helms, W. Saville-Kent, D.L. and V.N. Serventy and J.L. Stokes. They also approved five islands named after birds: Oystercatcher, Crake, Turnstone, Tattler and Shearwater, and also Wader Lagoon.

In November 1982 ornithologist M. Howard visited Pelsaert Island and published an account of his visit (Hall & Howard 1993). Additional information is from the Proceedings of the National Seabird Workshop held in Canberra in November 1993 on the status of Australian seabirds (Environment Australia, Canberra ca. 1996).

K.H. Coate visited the islands on 22 occasions between 1987 and 2007. Most were weekend visits of three to four-day duration between November and January to observe seabird breeding activity. An extended visit between 25 November and 16 December 1989 occurred when he was assisting with the filming of the wildlife documentary *Wilderness Regained*. Bases for filming were established with the co-operation of seasonal rock lobster fishermen in fishing shacks on Foale Island in the Pelsaert Group, Little Rat Island in the Easter Group and Pigeon Island in the Wallabi Group. Visits were also made with individual bird watchers within Australia and from overseas and charter groups for organisations including the Bird Observers Club of Australia (based in Victoria) and the WA Naturalists' Club. Another visit with people interested in historical aspects to sites connected to wrecks of early Dutch ships (*Batavia* in the Wallabi Group and *Zeewyck* in the Pelsaert Group was organised in October 1996 by the University of Western Australia (UWA) extension and the Maritime Museum with Coate as leader. This was part of the Willem De Vlamingh Tri-centennial Lecture Series. Observations of birds were recorded on all visits.

In February 1999, *Landscope Expeditions* in association with the UWA Extension organised an expedition to witness an annular solar eclipse at Greenough with an additional visit to the Abrolhos to collect plant specimens for the Department of Conservation and Land Management's *Vegetation survey of the Houtman Abrolhos*. Plant specimens were collected from 18 islands from which collections had not previously been made and observations of seabirds were also documented. A further series of *Landscope Expeditions* to the Abrolhos with Coate as leader were made in December 2001 and March–April 2005.

In 2000–2002 Indre Asmussen carried out surveys of White-bellied Sea-eagles and Ospreys in the Wallabi Group, mapped active nests and produced a draft document on the significance of high density populations of these birds at the Wallabi Group.

A final *Landscope Expedition* was carried out between 11–18 of December 2007 with Coate and Johnstone as joint leaders and with the aim to document and map breeding and roosting seabirds in the Wallabi, Easter and Pelsaert Groups and 68 islands were surveyed during this visit.

Rohan Clarke and George Swann made day visits to Pelsaert, Wooded and the Wallabi Islands in February 2020. Details of their observations were

placed on eBird: https://ebird.org/region/AU-WA

Finally, Johnstone and Darnell collated data in 2009 from Storr & Johnstone's unpublished data for the Department of the Environment, Water, Heritage and the Arts for developing marine Bioregional Plans for Australia's five marine regions. This project was mainly concerned with High Priority Seabirds in the South-West Marine Region mapping their distribution, movements and foraging areas.

## Annotated Species List

Classification and nomenclature follow Johnstone & Darnell (2022). Islands within each of the groups are listed from north to south. Unreferenced sightings below are from the Storr & Johnstone (unpublished data).

In the following descriptions, clutch size is given as C/*x* (*y*) where:

*x* = number of eggs in each clutch, and

*y* = number of clutches recorded.

e.g. C/1 (4), C/2 (11).

### Anatidae

*Cygnus atratus* Black Swan

Rare vagrant. Single birds reported in 1894 and 1968.

*Tadorna tadornoides* Australian Shelduck

Scarce visitor to salt lakes on West Wallabi and Pelsaert islands; usually in small parties (3–6).

*Anas gracilis* Grey Teal

Uncommon visitor; in ones, twos or small flocks (4–16), occasionally larger aggregations e.g. 23 in lagoons on Pelsaert Island in December 2007. Most records are from lagoons on Pelsaert and Wooded islands.

### Phasianidae

*Coturnix pectoralis* Stubble Quail

A large quail observed on Pelsaert Island in February 1978 was most likely to belong to this species (Fuller & Burbidge 1981). In south-western WA this species is nomadic, tending to move coastwards in summer and inland in winter.

### Apodidae

*Hirundapus caudacutus caudacutus* White-throated Needletail

Rare visitor from Northern Hemisphere. P.J. Fuller observed 10–12 birds over Pelsaert Island on 9 February 1984.

### Cuculidae

*Chalcites basalis* Horsfield's Bronze Cuckoo

Rare passage migrant or casual visitor. One heard on West Wallabi Island on 10 September 1959, one observed on Rat Island on 11 April 1977, one (an immature) seen on Wooded Island in November 1991 and one on Morley Island in December 1996. This species is mainly a visitor to south-western WA from late April to December.

### Columbidae

*Phaps elegans* Brush Bronzewing (Fig. 23)

Confined to North Island and the Wallabi Group (East Wallabi, West Wallabi, Tattler, Pigeon, Long and Beacon islands). Common on North Island, where they feed on the seeds of *Cakile maritima*; in ones and twos, occasionally in small parties (up to nine); larger aggregations (up to 20) at water tank near fisherman's huts; population estimated at ~100 in June

**Figure 23.** *Phaps elegans* Brush Bronzewing. Photo: J. Bush.

1985 (*Western Australian Bird Notes*, 1985). Uncommon to moderately common on other islands; usually single, occasionally in twos or threes and larger aggregations at water (10–15 at freshwater rockhole on West Wallabi in March 1989 and December 2001). Occurs in a range of habitat types from limestone islets, dense shrubbery to beaches. Breeding has been recorded in late April and from late July to early November; clutch size C/1 (4), C/2 (11). Nest is of fine twigs or *Spinifex* roots on ground, in a shrub or on a tussock of the grass *Spinifex longifolius*, in all cases at least partly sheltered from above by foliage.

## Rallidae

*Hypotaenidia philippensis mellori* Buff-banded Rail

Resident on Pelsaert Island, observations of mainly single birds usually among mangroves in vicinity of Lesser Noddy colonies, but also in the Sooty Tern colony. Also recorded on Rat Island in 1889 (Campbell 1890).

*Porzana fluminea* Australian Spotted Crake

Garstone (1978) observed a single bird at edge of a mangrove lake on Pelsaert Island in late October 1977.

*Zapornia tabuensis* Spotless Crake

Resident in the Wallabi Group (Beacon, Seal and Long islands), Easter Group (Alexander, Crake, Morley, Wooded, Bynoe and Leo islands and formerly on Rat Island) and Pelsaert Group (Jackson, Burton, Post Office, Uncle Margie, Burnett, Pelsaert, Gun and Middle islands). Locally very common among mangroves on Morley, Wooded and Pelsaert islands; uncommon to moderately common on other islands, where they favour dense scrubs (*Atriplex, Halosarcia, Nitraria, Myoporum*) and succulent mats of *Salicornia* and *Carpobrotus*. Small downy young observed on Wooded Island in late October 1996.

## Podicipedidae

*Tachybaptus novaehollandiae novaehollandiae* Australasian Grebe

Coate observed two birds in the enclosed lagoon on Wooded Island in March 2005.

## Turnicidae

*Turnix varius scintillans* Abrolhos Painted Buttonquail (Fig. 24)

Endemic to the Houtman Abrolhos. Formerly a common resident on North Island, but now apparently extirpated as there have been no reports since 2006 despite searching and use of motion cameras (Davis *et al.* 2020; Carter *et al.* 2022). Common to moderately common resident in the Wallabi Group (East Wallabi, West Wallabi, Seagull, Turnstone, Oystercatcher and Pigeon islands. On West Wallabi Island pairs and coveys up to eight, favouring areas near Slaughter Point, around forts

**Figure 24.** *Turnix varius scintillans* Abrolhos Painted Buttonquail. Photo: R. Clarke.

and at Shag Bay near fishermen's huts and low dunes covered with *Spinifex longifolius* and flats of coral grit wherever the shrub steppe of *Atriplex* and *Halosarcia* are relatively open. Also many scrapes have been observed amongst seaweed on shoreline. On East Wallabi, they favour areas of sandy substrates dominated by heath and thicker vegetation types (Carter *et al.* 2022). Breeding has been recorded from April to October; clutch size C/3 (16). The nest is a scrape in loose soil ~10 cm in diameter and 2 cm deep, sheltered from above by an overhanging bush.

## Haematopodidae

*Haematopus longirostris* Pied Oystercatcher (Fig. 25)

Resident. Common on East Wallabi and West Wallabi islands and the west coast of Pelsaert Island; uncommon to moderately common elsewhere. Recorded from North, Turnstone, Seagull, Little Pigeon, Long, Beacon, Traitors, Dakin, Dick, Marinula, Third Sister, Seven and islet adjacent, Eight, Seal, Rat, Little Rat, White Bank, Alexander, Campbell, islet near Gilbert, Suomi, Leo, Keru, Shearwater (and satellite islets), Little North, Wooded, Morley, Disappearing, Bynoe, Helms, Stokes, Sandy, White, White Bank, Jackson, Little Jackson, Murray, Foale, Burton, Post Office, Uncle Margie, Basile, Burnett, Coronation, Square, Three, Eight, Newman and Rotondella islands. Usually in ones or twos, occasionally in small parties or flocks

**Figure 25.** *Haematopus longirostris* Pied Oystercatcher. Photo: K. Coate.

(up to 20). They favour sandy beaches. Breeding has been recorded on East Wallabi, Turnstone, West Wallabi, Wooded, Square, Jackson and Pelsaert islands, occurring in early July to late August or early September, clutch size C/1 (2), C/2 (17), C/3 (2). The nest is typically an unlined scrape in sand just above highwater mark, ~15 cm in diameter and 2–3 cm deep.

*Haematopus fuliginosus fuliginosus* Sooty Oystercatcher (Fig. 26)

Uncommon resident on North Island and in the Wallabi Group (East Wallabi, Turnstone, Seagull, West Wallabi and Dick islands), Easter Group (Rat, Bushby, Bynoe, Keru, White, Little Rat, Serventy, Morley, Wooded and Leo islands) and Pelsaert Group (Uncle Margie, Pelsaert, Jon Jim, Stick, Square, Murray, Sandy, Two, Rotondella and Middle islands). Usually in ones or twos, occasionally small parties (up to eight). Favouring beaches and reef flats, among coral debris and around lagoons. Breeding has been recorded on West Wallabi Island, occurring in late July or early August, on Wooded Island in September–November and on Leo Island October–November, clutch size C/2 (3). There is also a record of an egg (Alexander 1922) or eggs (Hall 1902) taken on 24 November 1894 on an undisclosed island.

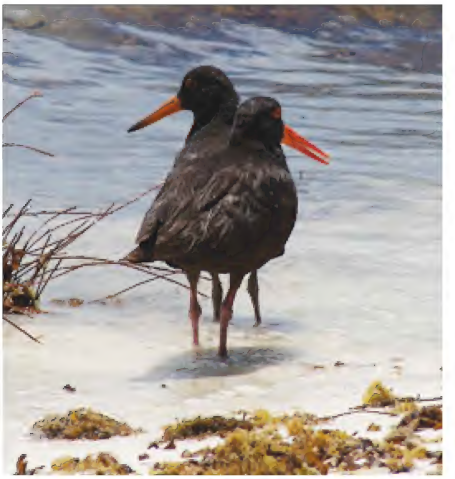

**Figure 26.** *Haematopus fuliginosus fuliginosus* Sooty Oystercatcher. Photo: W. Millar.

## Recurvirostridae

*Himantopus himantopus leucocephalus* Pied Stilt (White-headed Stilt)

Rare visitor. Three records from Pelsaert Island: observed by Burbidge in March 1973; Johnstone in August 1977 (two on a shallow lagoon at south-west end of island); and a single bird observed by Clarke and Swann in February 2020.

*Cladorhynchus leucocephalus* Banded Stilt

One record: two observed by Griffin (Storr *et al.* 1986) on Pelsaert Island salt lake in April 1977.

*Recurvirostra novaehollandiae* Red-necked Avocet

One record: six observed by Garstone (1978) and Fuller on Pelsaert Island in late October 1977.

## Charadriidae

*Vanellus tricolor* Banded Lapwing

Rare or casual summer–autumn visitor from the mainland. Single birds reported on North Island (December 1945), in Easter Group (April 1977) and on East Wallabi Island on 20 February 2020.

*Pluvialis fulva* Pacific Golden Plover

Rare visitor (October–February) from Northern Hemisphere. A few reports of single birds on Pelsaert Island and one record from West Wallabi Island near Slaughter Point.

*Pluvialis squatarola squatarola* Grey Plover

Visitor (September–June) from Northern Hemisphere. Moderately common on West Wallabi and Pelsaert islands and uncommon elsewhere (also reported from Morley and Keru islands); usually single, occasionally in small flocks (up to 13). Occurs on sea beaches, reef flats and lakes.

*Charadrius ruficapillus* Red-capped Plover (Fig. 27)

Resident on larger islands. Common on North, East Wallabi and West Wallabi islands; uncommon to moderately common elsewhere (Akerstrom, Oystercatcher, Seagull, Seal, Shag Rock, Third Sister, Long, Beacon, Eastern, Dakin, Dick, First Sister, Rat, Serventy, Leo, Morley, Suomi, Gilbert [and islet near Gilbert], Alexander, Bynoe, Campbell, Stokes, Sandy, Dry, White Bank, Disappearing, Stick, Gun and Pelsaert islands). Usually in ones or twos, occasionally in small parties or flocks (up to 30). Favours beaches, sparsely vegetated or blown-out dunes, open coral-grit flats, edges of saltlakes and airstrips. Breeding reported on West Wallabi, Pelican and Pelsaert islands in July to November.

**Figure 27.** *Charadrius ruficapillus* Red-capped Plover. Photo: J. Bush.

*Charadrius mongolus mongolus* Lesser Sand Plover

Rare visitor from Northern Hemisphere. Reported from West Wallabi and Pelsaert islands.

*Charadrius leschenaultii* Greater Sand Plover

Uncommon visitor (August–April) from Northern Hemisphere. Reported on North, East Wallabi, Turnstone, West Wallabi, Long, Rat, Morley, Wooded, Leo, Campbell, Dry, Little Rat, White Bank, Suomi, Pelsaert, Post Office, Gun, Murray and Middle islands. In ones, twos or small parties (up to seven). Occurs mainly on sandy beaches and around salt lakes.

*Thinornis cucullatus* Hooded Plover (Hooded Dotterel)

Rare visitor (February–September) from mainland. Reports of single birds on North, West Wallabi, Gun and Pelsaert islands.

## Scolopacidae

*Numenius phaeopus variegatus* Whimbrel

Uncommon visitor (August–June) from Northern Hemisphere. Reported from North, West Wallabi, Gilbert, Rat, Serventy, Newman and Pelsaert islands. In ones, twos or small parties (up to six), favouring the sheltered east coast of larger islands.

*Numenius madagascariensis* Far Eastern Curlew (Eastern Curlew)

Scarce or rare visitor (September–June)

from Northern Hemisphere. Mainly single birds, one party of six. Reported from West Wallabi, Gun, Post Office and Pelsaert islands.

*Limosa lapponica* Bar-tailed Godwit (Fig. 28)

Moderately common visitor (recorded all months) from Northern Hemisphere (a flagged bird from China observed on Pelsaert Island on 18 December 2007). In ones, twos or small flocks (up to 49). Reported from North, East Wallabi, West Wallabi, Pelican, Long, Wooded, Morley, Leo, Suomi, Bynoe, Campbell, White Bank, Pelsaert and Gun islands.

*Limosa limosa melanuroides* Black-tailed Godwit

Rare visitor from Northern Hemisphere. In ones or twos and reported from East Wallabi and Pelsaert islands.

*Arenaria interpres interpres* Ruddy Turnstone

Common visitor (all months) from Northern Hemisphere. Usually in small parties (up to 30) or flocks (up to 200). Reported from North, East Wallabi, Turnstone, Wann, West Wallabi, Long, Little Pigeon, Seagull, Seal, Shag Rock, Beacon, Dakin, Traitors, Eastern, Seal, Dick, First Sister, Second Sister, Third Sister, Rat, Little Rat, Alexander, Bynoe (and islets to west), Serventy (and satellite islets), Campbell, Gilbert (and satellite islets), Helms, Landscope, Stokes, Suomi, Keru, Leo, Morley, Wooded, Hummock, Disappearing, Dry, Little North, Tapani, The Coral Patches, White Bank, Nook, Jackson, Newman, Coronation, Burton, Uncle Margie, Pelsaert, Rotondella, Murray, Post Office, Robertson, Ship Rock, Gaze, Lagoon, Murray, Newman, Gun, Square, Middle, Stick, Sweet (Four), Travia, Two, Three, Sid Liddon (Six), Seven, Eight and Sandy islands. Favouring tidal rock flats and creeks, beaches, dry coral ridges, sandspits and salt lakes.

*Calidris tenuirostris* Great Knot

Uncommon visitor (September–April) from Northern Hemisphere. Reported from West Wallabi, and Pelsaert islands. In ones, twos or small parties (up to 20) and often in company with other waders. They favour beaches, salt lakes and tidal creeks.

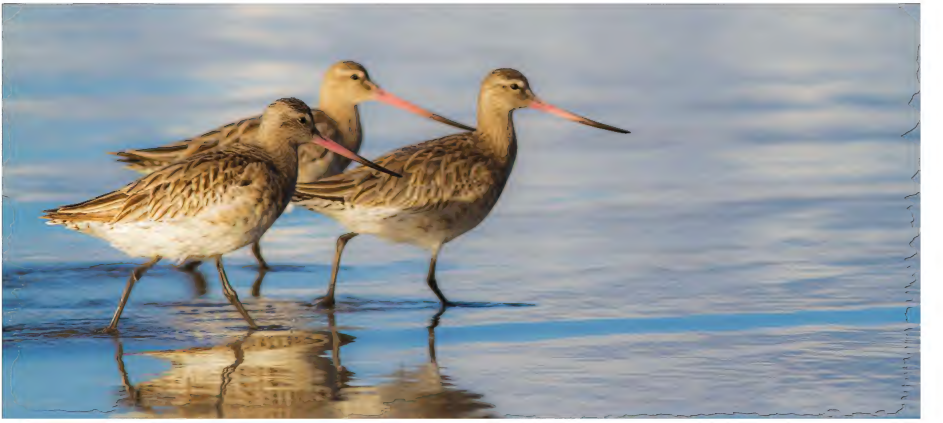

**Figure 28.** *Limosa lapponica* Bar-tailed Godwit. Photo: J. Bush.

*Calidris canutus* Red Knot

Scarce or rare visitor from Northern Hemisphere. Three reports are all in November–December from Pelsaert Island.

*Calidris acuminata* Sharp-tailed Sandpiper

Scarce visitor (September–April) from Northern Hemisphere. In ones, twos or small parties (up to seven). Reported from West Wallabi and Pelsaert islands. They favour salt lakes and tidal creeks.

*Calidris ferruginea* Curlew Sandpiper

Moderately common visitor (August–April) from Northern Hemisphere. In ones, twos or small flocks (up to 70). Reported from North, East Wallabi, West Wallabi, Akerstrom, Wooded, Little Rat, Suomi and Pelsaert islands. Shores of salt lakes, beaches, tidal rock flats and banks of seaweed.

*Calidris ruficollis* Red-necked Stint (Fig. 29)

Common visitor (all months but mainly August–April). In ones, twos or flocks (up to 250). Reported from North, East Wallabi, West Wallabi, Akerstrom, Seagull, Turnstone, Pelican, Beacon, First Sister, Eight, Alexander, Serventy, Campbell, Suomi, Wooded, Leo, Morley, Rat, Stokes, Disappearing, White Bank, Pelsaert, Gun, Murray, Square and Middle islands. Favours beaches, salt lakes, tidal creeks and rock flats.

**Figure 29.** *Calidris ruficollis* Red-necked Stint. Photo: K. Coate.

*Calidris alba* Sanderling

Uncommon visitor (August–May) from Northern Hemisphere. In ones and twos or small flocks (up to 20). Reported from North, East Wallabi, West Wallabi, Long, Dakin, Seal, Disappearing, Rat, Morley, Leo and Pelsaert islands. Mainly on sandy beaches.

*Xenus cinerus* Terek Sandpiper

Rare visitor from Northern Hemisphere. All three records are of single birds on Pelsaert Island in February 1979, December 1988 and December 1994.

*Actitis hypoleucos* Common Sandpiper

Rare visitor (October–April) from Northern Hemisphere. Reported from Oystercatcher Island and tidal flats on Pelsaert and Gun islands.

*Tringa brevipes* Grey-tailed Tattler

Moderately common visitor (August–June) from Northern Hemisphere. Usually in ones or twos, occasionally in small flocks (up to 12) or larger flocks (up to 35). Reported from North, East Wallabi, Turnstone, Eastern, Akerstrom, West Wallabi, Long, First Sister, Little Rat, Bynoe, Serventy, Stokes, Suomi, Morley, Wooded, Leo, Gilbert and islet opposite Gilbert, Burton, Post Office, Pelsaert, Burnett, Gun, Sandy, Square, Murray, and Middle islands. Beaches, tidal creeks and rock flats.

*Tringa stagnatilis* Marsh Sandpiper

Rare visitor from Northern Hemisphere. Listed by Tarr (1949) but he did not record the Common Greenshank and therefore probably may have been a mis-identification of this species. One observed on Little Rat Island on 11 December 1988.

*Tringa nebularia* Common Greenshank

Uncommon visitor (recorded all months) from Northern Hemisphere. In ones, twos or small flocks (up to 15). Reported from North, West Wallabi, Akerstrom, Marinula, Oystercatcher, Long, Bynoe, Rat, Morley, Wooded, Suomi, Stokes, Campbell, Pelsaert, Post Office and Gun islands. They favour the edges of salt lakes, beaches and tidal rock flats.

**Glareolidae**

*Glareola maldivarum* Oriental Pratincole

Rare visitor from Northern Hemisphere (in south-western WA from October–April). One observed by Garstone (1978) on Pelsaert Island in late October 1977.

**Laridae**

*Anous stolidus pileatus* Common Noddy (Brown Noddy) (Figs. 30–32)

Very common visitor (mid-August to late April). Breeding colonially on the south end of Pelsaert Island (estimates of over 170,000 but numbers fluctuate from year to year), Wooded Island (in small numbers). In November 1913 Alexander (1922) recorded a small colony breeding among the Sooty Terns

**Figure 30.** *Anous stolidus pileatus* Common Noddy, nesting on samphire *Tecticornia halocnemoides* – Pelsaert Island. Photo: R.E. Johnstone.

**Figure 31.** *Anous stolidus pileatus* Common Noddy. Photo: R.E. Johnstone.

but there are no subsequent records until 1999 when a colony of about 200 was located there (Burbidge & Fuller 2004). Formerly on Rat Island (in hundreds of thousands), breeding in August–January (mostly October and November); C/1 (almost invariably). Nests of seaweed (algae), twigs, grass, sponges and pieces of coral are placed up to 1.2 m above ground on low halophytic shrubs (*Atriplex cinerea*, *Nitraria billardierei*) or on ground. Nest density varies from 50,000 nests/ha to low densities 500 nests/ha (Burbidge & Fuller 2004). Many eggs and nestlings are taken by the large skink *Egernia kingii* from nests on ground and Silver Gulls take eggs from nest vacated by birds frightened by Ospreys and White-bellied Sea-Eagles flying over the colony.

**Figure 32.** Common Noddy on nest and egg. Photo: W. Millar.

The former colony on Rat Island was the largest in the Abrolhos. Campbell (1890) estimated its numbers as more than a million in December 1889, and that the mixed colony of Common Noddy and Sooty Terns contained 1,452,000 birds (Campbell 1900). Alexander (1922) was the last ornithologist to see the huge colonies of the Common Noddy and Sooty Tern on Rat Island. By 1936, Sandland (1937) found the island almost abandoned and blamed the introduced cat for the loss of the Common Noddy and Sooty Tern colonies. The colonies on Rat and Wooded islands vanished between 1913 and 1936. In December 1995 single nests under construction were located on Little North and Alexander islands but no colonies resulted (Burbidge & Fuller 2004). The Common Noddy and Sooty Tern are also sensitive to cold wet weather and will abandon their eggs and young during inclement weather with downy chicks dying in nest scrapes.

After the breeding season the Common Noddies completely desert the Abrolhos and their vicinity. The earliest date for a returning bird is 11 August when a single bird was observed by Johnstone off the south-east corner of the Wallabi Group. Campbell (1890) was informed that in 1889 and 1890 the birds first appeared on 14 and 16 August, respectively. On 18 August 1983 thousands were resting on coral rubble and rocks at edge of small lagoon on the south end of Pelsaert Island but no displays were observed. At the end of August 1966, a large colony was present on the south end of Pelsaert Island, but nesting had not begun (O'Loughlin 1969). On 24 August 1977 Johnstone observed about 20,000 birds had returned to south Pelsaert; hundreds were engaged in display flights over the island. Most birds had paired and were engaged in mutual display on the old nests or on the ground, presumably at former nest sites. These birds were also vigorously defending the nests and nest sites. Some nests in shrubs had been renovated and were ready for eggs. There is, however, little evidence for egg laying before late September. On many October visits (e.g., 1996), to Pelsaert Island many birds were still preparing nests and on some December visits (e.g., 1997 and 2001) most breeding started late with many birds still preparing nest and others on fresh eggs. By early February very few eggs are unhatched and many (in some years most) young have fledged. Large numbers of Common Noddies were still present on south Pelsaert on 24 March 1963 (Duke of Edinburgh, pers. comm.). By end of April generally only a few hundred remain on Pelsaert Island.

This species has been extending its range south in WA. A small colony was established on Lancelin Island (250 km south of Pelsaert Island) in 1992 and by 1996 it consisted of 300 breeding pairs and by 1998 more than 900 pairs (Dunlop & Mitchell 2001).

*Anous tenuirostris melanops* Australian Lesser Noddy (Figs. 33–35)

This subspecies is endemic to the Houtman Abrolhos. Very common resident (numbers fluctuate greatly depending on strength of Leeuwin Current) estimates of 60,000–70,000 pairs, 30,000–40,000 on Pelsaert, 6,000–15,000 on Wooded and 7,000–16,000 on Morley islands). Breeding in dense belts of mangroves (*Avicennia marina*) in the Easter Group (Morley and Wooded islands) and Pelsaert Group (Pelsaert Island); mid-August to late

**Figure 33.** *Anous tenuirostris melanops* Australian Lesser Noddy resting on *Nitraria*. Photo: K. Coate.

November and to late December in some years clutch size C/1 (invariably). The nests are a massive cake-shaped structure 13–15 cm in diameter and 10 cm deep, made of seaweed, especially brown alga *Sargassum* taken from strandlines and live green alga *Ulva* collected from adjacent lagoons, copiously cemented together with white excreta and placed 1–3 m up in fork of mangrove.

Until at least 1899 the Lesser Noddy was only known to nest on Pelsaert Island. By 1907 it had abandoned Pelsaert Island and had become established on Wooded Island, where Gibson estimated their numbers as 'hundreds of thousands' (Gibson 1908). This was probably a gross over-estimate for the mangroves of Wooded and Morley combined could hardly support more than 20,000 breeding birds. Alexander (1922) in 1913 considered the Lesser Noddies far fewer than the Sooty Terns or Common Noddies. By 1936 they had once again re-established on Pelsaert Island (Sandland 1937) and have bred there ever since although their numbers fluctuate enormously from year to year due to the strength of the south-flowing warm, low-salinity Leeuwin Current, that greatly affects the Houtman Abrolhos. For example, in mid-summer 1940–41, Serventy (1943) found the Pelsaert birds in two separate colonies of 1,000 and 5,000 birds; a year later the colonies had coalesced and numbered 20,000. Meanwhile they continued to nest on Wooded Island, with about 5,000 in mid-summer 1940–41 and 10,000 a year later (Serventy 1943). Johnstone found 10,000–15,000 birds nesting on Wooded Island in late August 1977 and 6,000–10,000 in October 1981. In December

**Figure 34.** Australian Lesser Noddy on nest. Photo: R.E. Johnstone.

1989, Burbidge and Fuller estimated the number of Lesser Noddy nests at 6,875, 5,325 in December 1991 and 14,485 in 1999 (Burbidge & Fuller 2004). In December 1988 some breeding pairs were being displaced by the expansion of the Pied Cormorant breeding colony on Wooded Island. In February 1999, Coate found some birds still nesting under cormorant nests, despite being covered in droppings and there was a noticeable reduction in the number of birds breeding in mangroves at this site. Some birds were relocating to fringing mangroves at the southern side of the Wooded Island lagoon.

The colony on Morley Island was first reported in summer 1940–41, when V.N. Serventy found about 1,000 nesting birds (Serventy 1943), but strangely there was no sign of this species when D.L. Serventy visited the island in December 1945. By 1970 they were re-established on Morley Island (Green 1972). Johnstone found 5,000 birds breeding here in late August 1977 (mean of 18 nests per tree on the lagoon) and 3,000–4,000 in early October 1981. In 1989, Fuller & Burbidge estimated the number of nests in December at 16,375, and in December 1991 at 11,745 nests (Fuller and Burbidge 1992).

At sunset on 13 August 1953, Ealey (1954) observed hundreds flying in to the Pelsaert Island mangroves whilst at sea, but he was unable to land and check if they were nesting. In August 1977, Johnstone found breeding pairs on Wooded and Morley islands well under way with many nests ready for eggs and several with a fresh egg. Most eggs, however, are not laid until October and November. The first of the fledged young go to sea in late January, the last in early April.

Unlike the Common Noddy, the Lesser Noddy remains in the region after breeding. At dusk and until dark in February 1999, Coate observed an almost continuous stream of thousands returning to their roosting and breeding colony on Pelsaert Island. In April 1976, 1977 and 1978, Griffin (Storr *et al*. 1986) observed flocks of 150, 150 and 600 perched in the daytime in Pelsaert Island mangroves and small flocks fishing north-west of the island. In early May 1981, birds had completely left

**Figure 35.** Australian Lesser Noddy breeding in mangal – Morley Island. Photo: K. Coate.

the breeding sites on Wooded and Pelsaert islands and only a few birds were observed fishing in the vicinity of the islands. In late June and early July 1980, Roberts in 1982 observed hundreds of birds in the vicinity of the islands (Storr & Johnstone 1970, unpublished data). This species forages well offshore to the west and south of the Houtman Abrolhos (south to the Cape Naturaliste Plateau-Leeuwin Canyon) and are frequently found dead or dying on the mainland after winter storms. Feeds on fish including small herrings, blue sprats, hardyheads and pilchards.

*Gygis alba* White Tern (White Noddy) (Fig. 36)

Rare vagrant. One observed foraging off Pelsaert Island in January 2001 and one among Lesser Noddies near mangroves on Wooded Island in

**Figure 36.** *Gygis alba* White Tern – Wooded Island. Photo: K. Coate.

December 2006 (Surman & Nicholson 2009). Also one observed by Johnstone and Coate circling mangroves on Wooded Island on 15 December 2007. In WA recorded in Timor Sea in November 2001, the Houtman Abrolhos in December 2007 and Lancelin Point in December 2017. The nearest breeding colonies are on the Cocos (Keeling) islands in tropical Indian Ocean.

*Larus novaehollandiae novaehollandiae* Silver Gull (Fig. 37)

Common resident throughout the Abrolhos. Mainly single birds and small groups (up to 60) occasionally larger aggregations (up to 200). Distributed throughout the islands but tending to concentrate around breeding seabirds, notably Pied Cormorants, Sooty Terns and Common Noddies, where they take eggs and steal food intended for nestlings. Breeding colonially (up to 150 pairs together) on North Island and in the Wallabi Group (West Wallabi, Long, Plover and Third Sister), Easter Group (Rat and islet to north, Roma, Dry, Gilbert, Alexander, Serventy, Gibson, Suomi, Keru, Shearwater, Wooded, Bynoe, Helms, Stokes, Joe Smith and Leo islands) and Pelsaert Group (Nook, Jackson, Newman, Coronation, Burton, Post Office, Uncle Margie, Sweet [Four], Pelsaert, Jon Jim, Stick, Gun, Middle, Murray, Ship Rock, Three, Eight, and Middle islands). Breeding in both autumn and summer, early April to mid-November; clutch sizes C/1 (7), C/2 (53) and C/3 (2) (Johnstone 1982).

*Larus pacificus georgii* Pacific Gull (Fig. 38)

Moderately common in the Easter and Pelsaert Groups; scarce in the Wallabi Group; and not yet recorded resident. Uncommon on North Island. Breeding singly in the Wallabi Group (East Wallabi, West Wallabi, Traitors and islet to south, Dick, First Sister, Plover, Seal, Saville-Kent, Dakin and Long islands), Easter Group (Wooded, Morley, Rat and adjacent islet, Little

**Figure 37.** *Larus novaehollandiae novaehollandiae* Silver Gull. Photo: P. Mortimer.

**Figure 38.** *Larus pacificus georgii* Pacific Gull – adult and immature. Photo: R. Smith.

North, Bushby, Bynoe, Eight, islet to south of White, Leo, Joe Smith, Tapani, Suomi, Keru, Gilbert and islet to south-west, Helms and islet to south-east, and Stokes islands) Pelsaert Group (The Coral Patches, and Burton, Post Office, Burnett, Little Jackson (= Fairbridge), Uncle Margie, Iris Refuge, Diver, Pelsaert, Gregory, One, Three, Seven, Ship Rock, Gun, Murray, Square and Stick islands). Breeding August to November C/1 (4), C/2 (26). One observed dropping a sea-urchin at Pelsaert Island and feed on its contents and a large midden (dumping area) on Eight Island with remains of sea-urchins, and shells, mostly trochus, *Turbo* and small baler shells (Fig. 39).

*Hydroprogne caspia* Caspian Tern (Figs. 40–41)

Moderately common resident. Breeding singly or colonially on North Island and in the Wallabi Group (West Wallabi, Dick, Seal, Turnstone, Long, Beacon and formerly on one of the Pigeon islands), Easter Group (Rat, Keru, Tapani, White Bank, Alexander, Bushby, Serventy, Leo, Shearwater, Morley and Wooded islands) and Pelsaert Group (Burton, Jackson, Burnett, Coronation [second islet NE], Foale, Pelsaert, Murray, Stick, Sweet [Four], Eight, Gun, Lagoon, Sid Liddon, and Square islands). Breeding from early September to mid-December; C/2 (39). Nest a scrape

**Figure 39.** Pacific Gull midden of sea-urchins and shells with disused Pied Cormorant nests on *Nitraria* in background. Photo: K. Coate.

**Figure 40.** *Hydroprogne caspia* Caspian Tern. Photo: P. Mortimer.

**Figure 41.** Caspian Tern chick – Leo Island. Photo: K. Coate.

in bare sand, 20–25 cm in diameter and 1–2 cm deep. The largest colonies (13–80 nests) reported on West Wallabi Island where most nests are 2–4 m apart. Elsewhere the largest group of 20 nests on Wooded Island (also record of 40–50 pair with eggs to fully feathered young in December 1989), whereas on the smaller islands the birds nest singly.

*Thalasseus bergii cristatus* Greater Crested Tern (Crested Tern) (Fig. 42)

Common resident. Breeding singly (rarely) or colonially (up to 1,000 pairs), on North Island and in the Wallabi Group (West Wallabi, Long, Wann, Traitors and adjacent islets to south, Beacon, Second Sister and formerly one of the Pigeon islands), Easter Group (islet to north of Rat I., Gibson,

**Figure 42.** *Thalasseus bergii cristatus* Greater Crested Tern on nest with egg. Photo: R.E. Johnstone.

Morley, Wooded, Gilbert, Helms, Stokes, Shearwater, Bynoe, Crake, and Leo islands) and Pelsaert Group (islet near Nook, Jackson and islet north-west of Jackson, Newman, Burton and Post Office, islet near Post Office, Burnett, Pelsaert [Fig. 43] and islet off north end of Pelsaert, Square, Sweet [Four], The Coral Patches, Coronation, Sid Liddon, Gun and Seven islands).

**Figure 43.** Greater Crested Tern breeding colony amongst low *Atriplex* – Pelsaert Island. Photo: K. Coate.

Breeding reported in April and July (also possibly late June) to December, mostly April and late August to early November; C/1 (1,476). Nest a scrape in sand or grit, usually among low bushes and sometimes lined with grass or twiglets.

*Sternula albifrons sinensis* White-shafted Little Tern (Little Tern)

Uncommon visitor or passage migrant from Kimberley and north-east Asia. In December 1889, Campbell (1890) collected one of two birds in winter plumage on Rat Island. On 1 July 1980 Roberts observed a flock of 14 in full breeding plumage resting on a sandspit on Wooded Island (G.M. Storr & R.E. Johnstone, unpublished data). The population of this species in the Kimberley and Pilbara appears to be increasing and extending southwards.

*Sternula nereis* Fairy Tern (Fig. 44)

Common and probably largely resident in the Abrolhos and numbers probably decrease in winter. Recorded throughout the Abrolhos, including North Island and often observed in mixed flocks with Roseate Terns. Breeding colonially (in groups of 6 up to 500) in the Wallabi Group (East Wallabi and West Wallabi, Beacon, Dick and First Sister islands), Easter Group (Rat, Tapani, Bynoe, Helms, Little North, Alexander, Serventy, Sandy, Morley and Wooded islands) and Pelsaert Group (Pelsaert, Jon Jim, Gregory, Newman, Little Jackson [= Fairbridge], Post Office, Uncle Margie, The Coral Patches, Murray, Gun, Square and Newman islands). Breeding from late October to early March; clutch sizes C/1 (87), C/2 (93), C/3 (3). Nest an unlined scrape on a shelly or sandy beach or on a coral ridge (Fig. 45); colonies occasionally adjoining those of Roseate Terns. Hatchlings vary in colour even within a clutch (Fig. 46). Of interest are recent significant breeding numbers on Morley Island (400–500 pairs breeding in 1996) and Rat Island (300 pairs in 2007). From May to July these terns are in eclipse plumage with a broad white forehead and black streaked white crown, adults with mainly yellow bill and

**Figure 44.** *Sternula nereis* Fairy Tern on nest scape. Photo: W. Millar.

**Figure 45.** Clutch of two Fairy Tern eggs amongst coral rubble – Rat Island. Photo: R.E. Johnstone.

**Figure 46.** Fairy Tern downy nestlings showing colour variation – Rat Island. Photo: K. Coate.

immatures have a dark bill with only the tip yellow. By September birds are in breeding plumage and engaged in fish-carrying pursuits.

*Onychoprion anaethetus anaethetus*
Bridled Tern (Figs. 47–48)

Common breeding visitor, arriving from Northern Hemisphere in late September or October and leaving between late February and early May. Breeding singly or in ones and twos on small islets and in loose colonies (up to 2,500) on larger islands. Breeding reported in the Wallabi Group (Pelican, Akerstrom, Alcatraz, Shag Rock, Plover, Tattler, Wann, Marinula, Pigeon, Little Pigeon, Long, Beacon, Traitors and adjacent islets, Eastern, Dakin, Seal, and Dick islands), Easter Group (Rat and adjacent islet to north, Little Rat, Little Roma, Dry, Robertson, Little North, Eastern, Gilbert and islet to south-west, Joe Smith, Alexander, Serventy, Campbell, Stokes, Crake, White, islet to south of Shearwater, Gibson, Suomi, Keru, Leo and islet to north, Helms and adjacent islets, Bynoe, Tapani and nearby islet, Morley and Wooded islands and formerly on Rat Island) and Pelsaert Group (Little Jackson [= Fairbridge], Newman, Uncle Margie, Arthur, Burnett and islet to north, Basile, Post Office, Coronation, Diver, Pelsaert, Gun, One, Two, Three, Sid Liddon [Six], Seven, Eight, Rotondella, Foale, Davis, Stick, Sweet [Four] and Square islands). Usually the egg-laying occurs in mid-November to early January; C/1 (invariably). The eggs are laid under bushes (*Nitraria*, *Atriplex* spp.), in rock crevices, beneath overhanging cliffs or in rock piles created during guano mining. Also under and in man-made objects e.g. under fisherman's huts, one sitting on egg in firebox of copper and another in a discarded drum on Pigeon Island on 7 December 1989.

The above generalisations on season of occurrence and breeding cover all records except one, *viz.* Johnstone's

**Figure 47.** *Onychoprion anaethetus anaethetus* Bridled Tern. Photo: R.E. Johnstone.

**Figure 48.** Bridled Tern on nest under vegetation. Photo: W. Millar.

observations of a small colony that bred on Newman Island in late June and early July 1980. A group of 50 adults and juveniles in the penultimate plumage still making the bell-like tinkling call is noteworthy that these birds were still in the Abrolhos when Bridled Terns were not normally present anywhere in Australia. This tropical seabird has extended its range southwards over the past hundred years. Gilbert (1843) found it breeding in the Abrolhos in January and February 1843, but it was not reported further south until 1889 when Campbell found a few nests on Phillip and Duck Rocks off Rottnest Island (Campbell 1900). Birds banded on Fisherman Island and Penguin Island (south-west of WA) have been recovered in Sabah, east Kalimantan and the Philippines during the winter (Johnstone & Storr 1998). Two birds from the Abrolhos fitted with geolocators have been tracked from Coronation Island (Pelsaert Group) migrating north past the Montebello Islands, east of Christmas Island through the Bali Strait and into the northern Celebes Sea just south of the Philippines - an overall round trip of over 8,000 km (Surman 2019).

*Onychoprion fuscatus* Sooty Tern (Figs. 49–52)

Very common visitor (late August to early May). Breeding colonially in small colonies (up to 5,000) to huge colonies (over 200,000) in the Easter

**Figure 49.** *Onychoprion fuscatus* Sooty Tern in flight – Pelsaert Island. Photo: K. Coate.

**Figure 50.** Sooty Tern resting on *Nitraria*. Photo: R.E. Johnstone.

Group (Rat, Little North, White, Stokes, Alexander, Suomi, Keru, Leo, Morley and Wooded islands, formerly on Rat Island) and Pelsaert Group (south end of Pelsaert and nearby Jon Jim islands). Possibly also on Seal Island in Wallabi Group, 10 birds resting on dense stands of *Nitraria billardierei* on 13 December 2001. Breeding in October and November; C/1 (almost invariably), C/2 (very rarely). Nest an unlined scrape in bare sand or coral grit, usually located under shrubs especially *Atriplex* or *Nitraria*, but sometimes in open or among grasses.

**Figure 51.** Breeding Sooty Terns. Photo: K. Coate.

**Figure 52.** Breeding Sooty Terns, December – Pelsaert Island. Photo: K. Coate.

In the Easter Group, colonies have appeared and disappeared on various islands. The Wooded I. colony was first mentioned by Alexander (1922), though in 1907, Gibson implied that the Pelsaert and Rat I. colonies were not the only ones in the Abrolhos (Gibson 1908). Alexander (1922) noted that the tern colonies on Rat I. were 'prodigious' in November 1913.

D.L. Serventy found Sooty Terns breeding on Morley Island in December 1945 (G.M. Storr & R.E. Johnstone, unpublished data). T.E. Bush found Sooty Terns breeding on Wooded Island in November 1970 but there were none breeding there in August 1977 (G.M. Storr & R.E. Johnstone, unpublished data) at a time when 5,000 were displaying over Pelsaert Island. Burbidge and Fuller (2004) estimated around 350 pairs on Wooded Island in 1996; 120,000 pairs in 1999 and only 400 pairs in 2000; however, other islands in this group were not surveyed at that time and large colonies (up to 40,000–60,000) occur on Alexander Island (Fuller *et al.* 1994).

The former Rat Island colony is generally regarded as the largest in the Abrolhos - in 1889 Campbell estimated that the mixed colony of Sooty Terns and Common Noddies contained 1,452,000 birds (Serventy *et al.* 1971). In October 1899, Hall (1902) found them breeding in two colonies each of a thousand pairs.

Gibson (1908) wrote, 'on Rat Island their numbers are prodigious, they nest under almost every bush and in many places also amongst the herbage; there is also a very large colony on the south end of Pelsaert Island and another on Wooded Island'. By the time of D.L. Serventy's visit in December 1945 the Rat Island colony was extinct. Fishermen informed him that the terns abandoned the island in 1938, some still present in 1934 but completely absent in 1939 (Storr *et al.* 1986). The combined impact of both the introduced black rat and the cat led to the eradication of this colony. The Rat Island Recovery Project was established in 1991 to monitor the return of breeding seabirds after the cats and rats were eradicated. After an absence of over 60 years seabirds began to re-colonise the island within a decade and by 2011–2012 seven species of surface nesting seabirds were again breeding on Rat Island including 72,324 pairs of Sooty Terns (Dunlop *et al.* 2015).

The colony on Pelsaert Island varies considerably. Serventy (1943) estimated 20,000–30,000 birds nesting or roosting for mid-summer 1941–42; O'Loughlin (1969) gave 15,000 for early January 1968. Estimates of numbers on Pelsaert I. between 1986 and 2000 are given in Burbidge and Fuller (2004) measuring the extent of the colony from ground mapping onto an aerial photograph and multiplying by a constant of 14,000±1,780 nests per hectare calculated from ground transects at a time when birds were incubating eggs. During this period the colony fluctuated from 179,000 in 1989 and 180,000 in 2000 to 247,000 in 1991.

*Sterna dougallii gracilis* Roseate Tern (Figs. 53–56)

Very common resident (not as abundant as the Sooty Tern or the two noddies, but by far the most numerous of the four resident 'white' terns). Breeding colonially in the Wallabi Group (West Wallabi, Plover, Long, Beacon, Dick, Far, Hall, Marinula and islet to north-east, North, Second

**Figure 53.** *Sterna dougallii gracilis* Roseate Tern flock. Photo: K. Coate.

**Figure 54.** Roseate Tern adult. Photo: W. Millar.

**Figure 55.** Roseate Tern hatchling. Photo: R.E. Johnstone.

**Figure 56.** Roseate Tern nestlings. Photo: W. Millar.

Sister, Third Sister, Traitors and islet to south and Seal islands), Easter Group (Wooded, islet to south of Campbell, Gibson, islet to north-west of Gilbert, Leo, Helms, Little North, Serventy, Little Stokes, Sandy, Keru, Shearwater, White and islet to south) and Pelsaert Group (Gregory, Robertson, Square, Sweet [Four], The Coral Patches, islet near Jackson Island, Burton, Burnett, Coronation, Little Jackson, Post Office, Jon Jim, Gun and Pelsaert islands). Breeding mid-April to early June and early November to late December; C/1 (4,499), C/2 (117), C/3 (1); nest a scrape in shallow sand or coral grit, with or without lining of grass; occasionally the egg is laid in a natural depression in

bare rock. Colonies regularly shift from one season to another and sometimes overlap those of Fairy Terns.

The largest reported colony comprised 2,656 occupied nests on Pelsaert Island in December 1946 (Serventy & White 1951). T.E. Bush found a colony on Seal Island in May 1969 that contained almost 2,000 nests (G.M. Storr & R.E. Johnstone, unpublished data). Other large colonies have been recorded on Square Island (1,500–1,800 pairs in November 1989); Wooded Island (1,500 pairs in December 2007); Morley Island (1,500–2,000 pairs in December 1996); Leo Island (about 1,500 pairs in December 2001); Long Island (five separate colonies (i) of 250 pairs on eggs, (ii) 186 pairs on eggs, (iii) 80–100 pairs on eggs, (iv) 1,000 pairs on eggs and (v) 200 pairs just establishing scrapes and eggs) on 14 December 2007; and on Seal Island (1,600 pair on eggs and newly hatched young in December 2001). Noteworthy also was a flock of 5,000–6,000 crowded onto Square Island in December 2007 (Coate 2007).

Strangely not listed as breeding on Gun Island by Surman & Nicholson (2015), but O'Loughlin (1969) found about 250 adults on eggs and freshly hatched chicks in January 1968 and Johnstone and Coate observed 40 nests all with one egg on western side of the island in December 2007.

In south-western WA this species has been expanding its breeding range southwards. Summer breeders were very numerous on Pelsaert Island in January and February 1843 (Gilbert 1843), but autumn breeders were not reported until the 1890s (Campbell 1900). The first record south of the Abrolhos was a beach derelict at Scarborough in July 1939. Flocks of autumn breeders were first reported in 1958 (in Cockburn Sound), though breeding was not proved until 1960 at Green Island (Johnstone & Storr 1998).

**Stercorariidae**

*Stercorarius antarcticus lonnbergi* Brown Skua

Uncommon visitor (April–August) to seas about the Houtman Abrolhos from the subantarctic and Antarctic islands. Usually single birds.

*Stercorarius pomarinus* Pomarine Skua (Pomarine Jaeger)

Rare visitor. One flying over the south end of Pelsaert Island on 6 December 1997 and one flying over Wooded Island on 6 November 1991 (Coate 2007).

**Phaethontidae**

*Phaethon rubricauda* Red-tailed Tropicbird (Fig. 57)

Rarely reported except when breeding on the islands, the birds presumably feeding well out to sea, e.g., at the Big Bank (50 km NNW of North Island). Formerly breeding in the Easter Group (Rat Island) and Pelsaert Group (Pelsaert Island); September (? August) to December (? January); C/1 (13), C/2 (5). Only one young is reared. The nest is a scrape in the bare sand, half-sheltered by a small bush or tussock of grass. No breeding records from Rat Island since the late 1890s but a few mostly unsuccessful from Pelsaert (see below).

There was an increase in the number of tropicbirds on Pelsaert Island in the 1940s and 1950s. At least three pairs were nesting there during D.L. Serventy's visit in late spring 1949; Serventy was informed that the birds had become more noticeable in the

**Figure 57.** *Phaethon rubricauda* Red-tailed Tropicbird. Photo: R.E. Johnstone.

past five years, before which they were rare. In spring 1949, Tarr (1949) found five nests. In late spring 1954, Warham (1956) found eight nests. By 1963 the tropicbirds had abandoned Pelsaert Island; V.N. Serventy recorded no birds during the visit in December 1963 (G.M. Storr & R.E. Johnstone, unpublished data). Indeed, no tropicbirds were recorded anywhere in the Abrolhos in the period 1955–1975. Gibson (1908) recorded none in November 1907 and was told by fishermen that none had been seen for several years and that they used to principally frequent the Wallabi Group.

In the mid-1970s tropicbirds appeared to be returning to Pelsaert Island. In April 1976, Griffin observed one over the island (Storr *et al*. 1986). In February 1978, Fuller saw two birds flying low over the south end of the island; here he found four dead birds. In February 1981 and 1984, Fuller saw two and five birds, respectively, over the south end of Pelsaert Island (G.M. Storr & R.E. Johnstone, unpublished data). In December 1987, Coate observed one flying over the southern part of the island and found a dead bird at the base of the lighthouse. On 3 December 1988 he found a bird incubating a single egg; another nest with a dead bird and a disused nest and by 10 December the adult was still incubating the egg and three birds were observed flying overhead. In November 1989 two birds were observed sitting in spinifex and up to five were observed flying and three nest scrapes with three dead birds near the 1988 nest site. In December 1989, Coate recorded three birds above the island and found the remains of

another dead bird again near the 1988 breeding site. In December 1996 nine birds were flying and hovering very close to the ground and appeared to be prospecting for nest sites and on 6 December 1997 six were observed near the same area. In December 2001 a single bird was observed over the southern part of the island and in December 2007, Johnstone and Coate found the remains of a dead bird at the base of the lighthouse (Coate 2007). Surman and Nicholson (2009) regularly observed (up to nine) displaying over Pelsaert Island in November/December of each year from 1994–2001.

In the Easter Group a single bird was observed flying over Wooded Island in December 1991. In recent times several adults have been recorded in the Perth region and in January 2021 two pairs were reported breeding successfully on Rottnest Island (Mather & Greenwell 2021).

*Phaethon lepturus* White-tailed Tropicbird

Campbell (1890) listed this species as an occasional visitor. Presumably G.K. Beddoes, manager of the guano works, was his informant. In WA this species is a moderately common visitor to far northern seas west of the continental shelf and in the south-west of the state it is a vagrant and only recorded from the Abrolhos and the south coast at Torbay.

## Spheniscidae

*Eudyptula minor novaehollandiae* Little Penguin

Rare or casual visitor from the south-west. Single birds occasionally stray northwards to the Abrolhos (also Geraldton) and surrounding seas in the cooler half of the year (March–September).

## Oceanitidae

*Oceanites oceanicus oceanicus* Wilson's Storm Petrel

Moderately common in adjacent seas during northward passage from the subantarctic in (mid-April to late June) and southward passage (mid-August to late October). Usually single birds, occasionally in small groups (2–8).

*Pelagodroma marina dulciae* White-faced Storm Petrel

Moderately common to common breeding visitor (August to April) in ones, twos or small flocks. Breeding in small to large numbers in the Wallabi Group (West Wallabi, Beacon, Eastern, Dakin, Helms, Dick, First Sister, Long, Seal and possibly Wann and Sandy islands), the Easter Group (Suomi, Bynoe, Dry, Little North, Keru, Morley and Leo and formerly 'Beacon Rock' near Rat islands) and the Pelsaert Group (Pelsaert, Stick and possibly Post Office islands). Breeding early to late October; C/1 (invariably). The largest colonies are on Beacon, Dick, Long, Bynoe, Morley, Suomi and Stick islands. Burrows are easily overlooked because they become filled in during the off season, so the birds possibly breed on other sandy islands. Also often breeding in disused Little Shearwater burrows (the latter is a winter breeder). The egg is laid in a long, narrow, steep burrow, usually dug in deep white sand, with or without vegetation (Johnstone & Storr 1998).

A few birds (usually single birds) have been observed at sea from early April to early September. By mid-August some of them are returning to the islands. The eggs are mostly laid in the second and third weeks of October; they hatch in late November or early December. This species is also attracted

to lights of boats at night – often crash-landing on boat decks.

## Diomedeidae

*Diomedea exulans* Wandering Albatross

Rare or uncommon winter visitor from subantarctic to surrounding seas. Ferguson (1921) observed an immature west of the Abrolhos on 27 May 1919. A skull found on Coronation Island probably belonged to this species rather than the much rarer *D. epomophora.*

*Thalassarche chrysostoma* Grey-headed Albatross

Rare winter visitor (March to September) to surrounding seas from subantarctic and Antarctic islands. A skull found on Pelsaert Island, now in Australian National Wildlife Collection, Canberra.

*Thalassarche carteri* Indian Yellow-nosed Albatross

Visitor (mid-April to late November) to surrounding seas from subantarctic islands in the southern Indian Ocean. Moderately common in winter (June–September), uncommon in the warmer months. Usually single birds, occasionally in small parties (up to five). Observations include Alexander (1922) who listed this species as numerous in the neighbourhood of the Abrolhos; Tarr (1949) observed five feeding on the west side of Pelsaert Island in September 1948; and Johnstone observed five over the Rolland Passage in August 1977. Remains of dead birds commonly found on islands including West Wallabi, Long, Wooded, Suomi and Pelsaert (G.M. Storr & R.E. Johnstone, unpublished data).

## Procellariidae

*Macronectes giganteus* Southern Giant Petrel (Fig. 58)

Visitor (February–November, mostly June to September) to surrounding seas from the southern subantarctic and Antarctic islands. Moderately common in mid-winter, but generally scarce; usually single, occasionally in small groups and occasionally coming close to islands, also attracted to boats. A specimen in the Western Australian Museum was obtained in the Abrolhos in 1894. A bird in poor condition was blown ashore at Geraldton in October 2007, was rehabilitated by carers and released near East Wallabi Island. Remains of dead birds found on Suomi, Pelsaert and Square islands. Some sightings could be of the rarer Northern Giant Petrel (*M. halli*) that ranges in WA north to Broome.

*Daption capense capense* Cape Petrel

Visitor (early May to early October) to surrounding seas (including inshore areas often close to islands and in Geraldton harbour) from subantarctic islands. Uncommon; usually single or in small parties (up to six). Often

**Figure 58.** *Macronectes giganteus* Southern Giant Petrel. Photo: R.E. Johnstone.

follows ships and fishing boats. Remains of birds often found in both Eastern Osprey and White-bellied Sea-Eagle nests.

*Pachyptila belcheri* Slender-billed Prion

Uncommon or rare winter visitor to surrounding seas. Not observed at sea, but commonly found dead on west coast from the Houtman Abrolhos and Kalbarri south to Busselton between early May and mid-September. In November 1944, D.L. Serventy found a mummified specimen identified as *P. belcheri* in a White-bellied Sea Eagle nest on Pelsaert Island (G.M. Storr & R.E. Johnstone, unpublished data).

*Pterodroma macroptera* Great-winged Petrel

Visitor to seas west of the Abrolhos. In WA breeding on islands off the south coast in the Albany area and Archipelago of the Recherche (arriving in January and eggs laid from early May to late June and chicks fledging from October to December). Newly flying young are vulnerable to southerly gales and found in the interior and west of the continental shelf north to 27°S. Region of origin of birds off the west coast and in Abrolhos region uncertain. WA populations relatively sedentary and foraging in Southern Ocean well south of the continental shelf. However, other subantarctic populations disperse widely after breeding. Brown (1948) saw two on 27 June 1947, and Harrison (1979) saw up to 12 following the ship on 4 November 1978. Warham (1956) found a head on Pelsaert Island in early summer 1954.

*Pterodroma lessonii* White-headed Petrel

Rare winter visitor to seas west of the Abrolhos from subantarctic. One observed on 27 May 1919 (Ferguson 1921). In WA ranging in seas north to 28°S and most observations are from seas off south coast and lower west coast from late May to early November.

*Pterodroma mollis* Soft-plumaged Petrel

Winter visitor to surrounding seas, mainly west of continental shelf, from subantarctic. Several observed by Ferguson (1921) west of the Abrolhos on 27 May 1919. The remains of a bird found in an Eastern Osprey nest on Pelsaert Island in November 1982 is now in the Australian National Wildlife Collection, Canberra. Records of single birds and groups (up to 20) reported between the Abrolhos and Bunbury between late March and early September, regularly following ships.

*Procellaria aequinoctialis* White-chinned Petrel

Rare winter visitor to seas west of the Abrolhos from subantarctic. Brown (1948) observed one following the ship on 27 June 1947. In WA most reports are south and west of the continental shelf, north to 28°S.

*Calonectris leucomelas* Streaked Shearwater

Uncommon to moderately common visitor (November to May) to seas west of the Abrolhos from subtropical islands in the north-west Pacific. Groups of two, eight and 20 birds observed by Johnstone (1982) in the Geelvink Channel on 10 May 1981. One observed near The Coral Patches (Pelsaert Group) in March 1990 and single birds and groups (up to six) observed by J. Fitzhardinge in seas west of North Island in April 1993 and March–April 1994 (pers. comm.). Also, Barton (1984) reported that birds were seen almost daily west of Kalbarri in March and early April 1984. This fairly recent southern dispersal is no doubt

linked to the south-flowing warm water of the Leeuwin Current.

*Ardenna pacifica* Wedge-tailed Shearwater (Fig. 59)

Very common breeding visitor (August–May), estimated to be 1,117,816 pairs (Fuller *et al*. 1994). Breeding in the Wallabi Group (West Wallabi Island), Easter Group (formerly on Rat Island (until 1945) but may have recently re-colonised this island), Alexander and the Pelsaert Group (Pelsaert, Gregory, Davis, Gun, Middle, Murray, Sweet (Four), One and Two islands). These are the largest colonies in the eastern Indian Ocean. Breeding mid-November to early December; clutch size C/1 (invariably). The largest colonies are on West Wallabi Island and south end of Pelsaert Island where tens of thousands of pairs excavate their nest burrows in beds of coral grit covered with saltbush *Atriplex* and they also burrow in dunes among *Nitraria* and *Spinifex longifolius* and occasionally in rock crevices and under bushes (Fig. 60). The colonies in the central and northern parts of Pelsaert Island and on the other islands are much smaller and the smallest colony is on Gregory Island (about eight pairs). The Rat Island colony was still flourishing in 1913, but after the introduction of cats it declined; the birds lingered on until at least December 1945, when D.L. Serventy found 10 occupied burrows. Noteworthy is that several dead birds have been found on Rat Island in December 2006, and two live birds observed there in December 2007 (Surman & Nicholson 2009). Cats and rats have been successfully eradicated from Rat Island (Burbidge & Morris 2002) so it is possible that Wedge-tailed Shearwaters may have re-colonised the island in low numbers. It possibly also bred on North Island in the distant past as subfossil petrel skeletons of this species were found in blown out dunes by Storr (1960).

**Figure 59.** *Ardenna pacifica* Wedge-tailed Shearwater. Photo: Photographer unknown.

Wedge-tailed Shearwaters are absent from the Abrolhos in mid-winter. They return in the second half of August and begin immediately to renovate their burrows, flying in from the seas before it becomes dark and leaving before dawn. They continue to return to the islands throughout September and October, pairs calling (moaning or crooning 'kroo-er') inside the burrows at night and single birds squatting quietly outside them; a few birds remain in the burrows during the day.

Early in November they cease to visit the islands at night. Towards the

**Figure 60.** Wedge-tailed Shearwater on nest under vegetation. Photo: W. Millar.

end of the second week in November they begin to return and to make final preparations of the burrow and egg chamber. On the following evening, egg laying commences, and it is largely completed by the end of November and early December. The eggs hatch in January and by early February the chicks are unattended during the day. By late April the young are large, but still downy, and remain alone in the burrow throughout the day. At this stage the adults are still returning in numbers at night. By early May many chicks are still downy, but most of them are wholly or partly fledged, e.g., a WA Museum specimen A16926 collected on 5 May has crown, back, wings and tail feathered, the neck partly downy and the abdomen wholly downy; in its stomach were the remains of cuttlefish, indicating that it was still being fed. As late as 10 May considerable numbers of adults are present in adjacent seas but by late April–early May many adults have ceased returning to feed their young and about two weeks after being abandoned the young take to the sea. Breeding colonies in the Pilbara leave their breeding region in April, in the Shark Bay area in mid-May and further south late May (G.M. Storr & R.E. Johnstone, unpublished data).

In WA, this tropical species appears to be increasing in numbers and spreading southwards. Gilbert and other collectors did not record this species in the south-west during the 1840s and it was first collected on Rottnest Island in 1889 and on Carnac Island in 1917. F. Whitlock only saw a small series of burrows at the west end of Rottnest in 1904; Storr gave an estimate of nearly 600 burrows at the west end in 1956; Saunders and de Rebeira (1985) counted 2,570 burrows here in 1982; and Sims counted 5,856

**Figure 61.** Feeding flock of Wedge-tailed Shearwaters. Photo: K. Coate.

burrows in 1993 (G.M. Storr & R.E. Johnstone, unpublished data). In WA it is very common in western seas between 16°50′S and 33°S and up to 300 km offshore. Further north and east it is only a seldom-recorded winter visitor to seas west of continental shelf. Mostly feeding well offshore, usually singly, occasionally in flocks and rafts (up to 150) (Fig. 61). Judging from tracking data of birds from WA, they winter over the Ninety East Ridge and in the Mid-Indian Ocean Basin about 4,000 km north-west of the Houtman Abrolhos. This is the same region that Flesh-footed Shearwaters breeding on islands off the south coast of WA also migrate to in winter.

*Ardenna carneipes* Flesh-footed Shearwater

Common passage migrant (late April to late June and late August to early November) over seas well west of the Abrolhos. Brown (1948) considered them the predominant seabird on 27 June 1948 and J. and B. Fitzhardinge found them common near North Island in April 1994 (pers. comm.), but Harrison (1979) saw only one on 4 November 1978 and Surman *et al.* (2016) observed one at sea near Leo Island in July 2014. In WA this species breeds in hundreds of thousands on islands of the south coast from Cape Leeuwin east to Daw Island and following breeding form large aggregations off the lower west coast before migrating north-west past the Abrolhos to winter in the western Indian Ocean. Gibson-Hill (1953) predicted that after breeding on islands off the south coast of WA the Flesh-footed Shearwaters from this area travelled west, following the coast north past Cape Leeuwin and Cape Naturaliste towards the Houtman Abrolhos. Then they strike out diagonally across the southern Indian Ocean on course for a destination north of the Mascarene Islands. This has proved to be a very accurate prediction. Recent tracking of three post-breeding birds from King George Sound, WA, shows them following the south coast, then north skirting the Houtman Abrolhos then northwest across the Indian Ocean (Powell 2009).

*Ardenna gravis* Great Shearwater

Rare vagrant. One observed by D. Mantle approximately 130 km west of the Houtman Abrolhos at 28°30'S, 112°21'E on 31 October 2008 (pers. comm.). Also several large shearwaters observed by Fitzhardinge near North Island in April 1994 were possibly this species (pers. comm.).

*Puffinus huttoni* Hutton's Shearwater

Common to moderately common passage migrant (February to early June, and late July to early December) through Abrolhos seas, generally well offshore in ones, twos or small flocks (up to 20), e.g., a flock of 20 in Geelvink Channel in February 1999; occasionally much larger flocks, e.g., flock of 50 in rafts at sea with Wedge-tailed Shearwaters in Eastern Passage near Leo Island and numerous others in The Channel (Pelsaert Group). Breeding on South Island, New Zealand (NZ), and dispersing mainly to seas off north WA. Thousands observed flying southwards outside the Ningaloo reefs in August 1978 and 1979 and a flock of 150–200 near Legendre Island in August 1988 and a specimen collected from Hermite Island on 22 October 2000. Surman and Nicholson (2009) observed hundreds across the North-West Shelf between May and July 2005. Seven specimens in the WA Museum found derelict on south and west coasts north to Perth region, including a juvenile banded near Christchurch, NZ, on 31 March 1969 and found dead near Hopetoun on 11 December 1970. The northward autumn passage is evidently distant from the west coast of WA as there are few observations at sea and few birds found derelict after storms in that season.

Warham's (1981) suggestion that this species circumnavigates Australia needs confirmation. It has been collected in south-western Torres Strait in April and May but there are no reports from the Northern Territory or the north coasts of WA in the Arafura Sea. There are records from Ashmore Reef and Timor Sea so perhaps more likely they circuit the eastern Indian Ocean.

*Puffinus assimilis tunneyi* Little Shearwater (Fig. 62)

Common visitor (April to December). Breeding in the Wallabi Group (ca. 1,000 to 9,000 pairs on West Wallabi Island; 5,000 on Beacon Island, 200 to 700 on Long, Dick, Eastern, Dakin, Seal, First Sister, and Saville-Kent islands; and five to 150 on Pigeon, Seagull, Little Pigeon, Lumley, Marinula, Wann and Tattler islands and 20 on Hall Island and Shag Rock), the Easter Group (~ 3,000 pairs on Morley and Leo islands; 1,500 on Suomi Island, 1,200 on Bynoe Island, 700 on Dakin and Keru islands, 300 to 500 on Wooded, Leo and White islands; 100 to 250 on Campbell, Shearwater, Alexander and Helms islands; and 2–50

**Figure 62.** *Puffinus assimilis tunneyi* Little Shearwater. Photo: R.E. Johnstone.

on Gilbert, Crake, Stokes, Serventy, Eastern, Rat and Little Rat islands), and the Pelsaert Group (1,000 to 2,000 pairs on Stick Island, 1,700 on Gun Island, 400 to 500 on Hummock Island, 200 on Seal Island, 70 on Square Island, 35 on Iris Refuge and about 50 on Pelsaert Island) (Johnstone & Storr 1998).

The size of the former Rat Island colony is unknown; evidently, they were still breeding here in 1945, as D.L. Serventy found a dead bird on the island in December of that year (G.M. Storr & R.E. Johnstone, unpublished data). Some recolonisation on Rat I. may have occurred in recent times as Surman and Nicholson (2009) reported eight burrows along the western coast of Rat Island in December 2006.

This species nests mainly in burrows excavated in white sand and to a lesser extent in guano; relatively few nests under dense shrubs and matted succulent vegetation or in crevices in the limestone. Most burrows are 50–100 cm long. In August 1977 Johnstone found that burrows attained a density of 1.2–1.4 per $m^2$ in the most heavily populated parts of Morley and Wooded islands. In February 1999, Coate estimated 150–200 burrows in a low-lying sandy area 70 x 34 m on First Sister Island.

The shearwaters begin to return to the islands in the first half of April, and by the third week some burrows are re-excavated. At this time the birds are commonly found on the surface in the daytime but are generally silent, even at night. By early May some pairs are calling quietly together in their burrow at night. In late June the colonies are much noisier, the birds calling in their burrows by day as well as at night. In the evening the calling of pairs often increases in volume and pitch to a frenzied caterwauling. The single egg is laid between early July and late August. The young fledge in November or December. On 4 December 1988 and 1 December 1991, Coate observed juveniles unable to fly, swimming in the lagoon on Wooded Island, and on 6 December 1992 a just-fledged juvenile in the Geelvink Channel only able to fly a short distance. The latest record of an adult is 9 December; presumably the last of the young are abandoned soon after this date. Some populations appear to be a bit later judging from a downy chick with primary feathers just developing observed in a burrow on Hummock Island on 15 December 2001. Earlier young are probably abandoned in November, e.g. one found at sea on 7 December, unable to fly, very fat, but only having some cephalopod beaks in its stomach. On some islands burrows are destroyed by basking Australian Sea Lions hauling out onto sandy areas (G.M. Storr & R.E. Johnstone, unpublished data).

Mainly feeding well offshore (judging from the paucity of observations), usually in ones, twos or small parties. Foraging north to Shark Bay and Exmouth from 4–200 km off coast. Commonly found derelict on west coast from Geraldton south to Cape Freycinet between mid-May and early December, mostly in winter.

## Sulidae

*Morus serrator* Australasian Gannet

Uncommon visitor (June–October) to Geelvink Channel; usually single. Most sightings are nearer the mainland than the islands, but birds have been seen close to Beacon and Pelsaert Is. A nestling ringed in NZ was found dead on a mainland beach near Northampton when less than a year old (Glauert 1956).

## Anhingidae

*Anhinga novaehollandiae novaehollandiae*
Australasian Darter

Rare vagrant. One observed by M. Glazier (pers. comm.) in the lagoon on Pelsaert Island in late 1950.

## Phalacrocoracidae

*Microcarbo melanoleucos melanoleucos*
Little Pied Cormorant

A fairly recently established resident. First reported in 1979 and breeding (possibly for the first time in 1983) on Wooded Island in the Easter Group. In August 1983, Johnstone found the colony to contain 10 well-constructed pads of sticks placed on a rock ledge a little more than a metre above the sea. The nests were sheltered above by overhanging limestone. On 1 December 1991, Coate recorded 20 birds on Wooded Island and observed small numbers here in December 1992, 1994, October 1996, December 1997 and March 2005.

*Phalacrocorax varius hypoleucos*
Pied Cormorant (Australian Pied Cormorant) (Figs. 63–64)

Common resident. Breeding in the Wallabi Group (West Wallabi Island, Shag Rock, islet south of Traitors Island, Wann Island and Lagoon Island), Easter Group (Wooded Island and islet off Rat Island) and Pelsaert group (islet off north end of Pelsaert Island, Square, Sid Liddon [Six], Seven, Eight and Middle islands). Breeding mid-August to November; clutch C/2 (30), C/3 (64), C/4 (13).

**Figure 63.** *Phalacrocorax varius hypoleucos* Pied Cormorant nesting on *Avicennia* mangal. Photo: K. Coate.

**Figure 64.** Pied Cormorant at nest with eggs. Photo: P. Mortimer.

The largest colony is on Wooded Island, where 450–1,000 pairs nest in mangroves but numbers fluctuate; e.g. Serventy estimated 650 to 700 nests in December 1945 (G.M. Storr & R.E. Johnstone, unpublished data), Johnstone estimated 500 to 600 pairs in October 1981 and 500 to 800 in August 1983, and Burbidge and Fuller (2004) reported 700 pairs in 1991, 450 in 1993 and 1995 and 500 in 2000. The colonies on the other islands are generally much smaller (10 to 600 pairs) and the nests are placed on bushes of *Nitraria billardierei* (Fig. 65) or *Atriplex* or on bare rock, as well as in mangroves. Rookeries often change position; for example, on Sid Liddon (Six) Island in 2007 there were four old rookeries: (i) approximately 100 nests 5–6 years old, (ii) approximately 100 nests on cliff edge about two years old, (iii) approximately 150 nests about three years old and (iv) approximately 150 nests about three years old. A total of 44 disused nests were counted on Wann Island in February 1999.

The colony on Wooded Island has moved over the years into mangroves *Avicennia marina* around the south-western end of the lagoon that have a high density of Lesser Noddy nesting. In December 1988 the colony had moved well into the Lesser Noddy breeding area and after several breeding seasons the nests and droppings of the cormorants almost kill the vegetation and at that stage the birds shift into a new area and the mangroves re-shoot. By 1991 the colony had moved back eastwards away from the Lesser Noddy breeding area. Most nests are constructed of matted *Myoporum, Nitraria* and seaweed (wet and dry) held together with excreta

**Figure 65.** Disused Pied Cormorant nests on *Nitraria* – Sid Liddon Island. Photo: K. Coate.

and placed in branches of dome-shaped *Avicennia* (up to nine nests per tree). Nests are sometimes built on top of nests from previous year. This species has also bred on a barge in Geraldton Harbour (Johnstone and Coates, unpublished field diaries).

*Phalacrocorax carbo novaehollandiae* Great Cormorant

Rare visitor; a few records mainly in autumn, one in December from the Pelsaert Group and one from North Island.

## Ardeidae

*Egretta novaehollandiae* White-faced Heron

Scarce visitor: usually single birds and most reports are from salt lakes and lagoons on West Wallabi and Pelsaert islands. Also reported from Wooded and Gun islands.

*Egretta sacra sacra* Eastern Reef Heron (Pacific Reef Heron)

Moderately common resident throughout the Abrolhos, including North Island, usually single, occasionally in twos. Favours shallows on rocky shores. Breeding from late July to November; clutch C/1 (1), C/2 (3), C/3 (1). The nest is made of sticks and usually placed on cliff ledges below overhanging limestone or in mangroves. Two nests with downy young on Little Rat Island were built amongst lobster pots on a jetty. One nest contained a single chick, the

other nest three chicks, one of which was much smaller. About 3% of birds belong to the white phase. Scattered over an open area on Plover Island in December 2001 were the dried remains of several hundred 12–15 cm long Prickly Leatherjacket fish, identified by S. Morrison of the WA Museum as *Chaetodermis penicilligera.* These small fish appeared to have been transported there by birds, most likely this species, as under the pectoral fin on one side of all fish examined, the soft area had been opened to access the internal organs (G.M. Storr & R.E. Johnstone, unpublished data).

## Pelecanidae

*Pelecanus conspicillatus* Australian Pelican (Fig. 66)

Formerly a visitor in small flocks; now a rare vagrant. Breeding in the Wallabi group on Pigeon Island sometime before 1889 (Campbell 1890) and on Pelican Island in 1907 (Gibson 1908). Few subsequent reports: J. Akerstrom observed two in the vicinity of West Wallabi Island for several weeks in summer of 1932–33 (pers. comm.); two observed on a lagoon on Pelsaert Island in February 1978 (Fuller & Burbidge 1981) and Coate observed one on Leo Island in February 2005 (Coate 2007).

## Pandionidae

*Pandion haliaetus cristatus* Eastern Osprey (Figs. 67–68)

Moderately common on the Wallabi islands (20 breeding pairs recorded by I. Asmussen in 2000–2002) (Asmussen 2005); common to very common elsewhere. Breeding on North Island and in the Wallabi Group (East Wallabi, West Wallabi, Shag Rock, First Sister [3rd islet north], Second Sister, Third Sister, Naturalist, Tectus, Pigeon, Little Pigeon, Wann, Plover, Saville-Kent, Hall, Long, Beacon, Seal and Dick islands), Easter Group (Rat, Bushby, Little Rat, Roma, Alexander, Serventy, Campbell, Shearwater, Stokes, Suomi, Tapani, Keru, Bynoe [2nd islet to west], Helms [islet 4 to south-west], Wooded, Leo, White Bank, and Joe Smith islands) and Pelsaert Group (Hummock, Arthur, The Coral Patches,

**Figure 66.** *Pelecanus conspicillatus* Australian Pelican. Photo: R. Smith.

Nook, Jackson, Gaze [islet to south], Lagoon, Newbold, One, Rotondella [2nd islet to south], Sandy, Ship Rock, Sid Liddon [Six], Newman, Coronation, Burton, Post Office, Burnett, Basile, Pelsaert, Jon Jim, Gun, islet off southern end of Gun I., Murray, Stick, Sweet [Four], Square and Middle islands) in late July to mid-October. Clutch C/1 (4), C/2 (13), C/3 (46), C/4 (4). Many eggs are infertile and usually only one or two young (very rarely three) are reared. Nest typically a truncate cone of sticks and beach debris, including dead seabirds and fishes, 0.9–6.2 m in diameter and 0.7–2.0 m high; usually placed on bare ground, occasionally on man-made structures, e.g. jetties, tanks, radio aerials, on top of stacked crayfish pots and poles especially erected by fishermen for ospreys. One nest near guano jetty on Pelsaert Island was more than 2 m in height and composed of an amazing array of flotsam from fishing boats including thongs, rope, buoys, life jackets as well as turtle skulls, sponges, sticks, driftwood and stones (Fig. 69). Feeding mainly on fish including smelt, herring and parrotfish, but also taking White-faced Storm Petrels and large lizards *Egernia stokesii*. The presence of this species flying over islands cause the 'dreads' or 'panics' of ground-nesting or roosting seabirds, which rise up en masse in response to alarm notes following the arrival

**Figure 67.** *Pandion haliaetus cristatus* Eastern Osprey. Photo: K. Coate.

**Figure 68.** Eastern Osprey on nest stack. Photo: P. Mortimer.

**Figure 69.** Eastern Osprey on a large nest stack – Pelsaert Island. Photo: K. Coate.

of an intruding Osprey overhead and usually circle the island or swoop low over the sea before returning (Johnstone & Storr 1998).

## Accipitridae

*Haliaeetus leucogaster* White-bellied Sea-Eagle (Fig. 70)

Very common resident in the Wallabi Group (up to eight observed flying at one time and 18 breeding pairs recorded by I. Asmussen in 2000–2002) (Assmussen 2005); moderately common elsewhere in the Abrolhos including North Island Breeding in the Wallabi Group (East Wallabi, Pelican, West Wallabi, Long, Seal, and Dick islands and formerly on Pigeon Island), Easter Group (Serventy, Shearwater, Morley and White islands and formerly on Rat Island), and Pelsaert Group (Hummock, Coronation, Uncle Margie, Gun, Stick, and Pelsaert islands and islet off north end of Pelsaert Island):

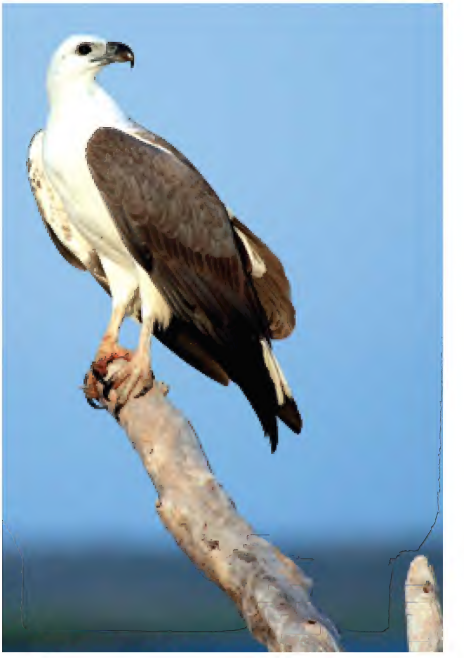

**Figure 70.** *Haliaeetus leucogaster* White-bellied Sea-Eagle. Photo: K. Coate.

early July to late August. Clutch C/1 (5), C/2 (21), C/3 (2). They usually build their own nest, a low sprawling, loose accumulation of sticks, 0.9–2.4 m in diameter and 0.2–1.1 m high, lined with green leaves and placed on rocky promontories, sandhills or tops of shrubs including *Pittosporum* also on mangroves, but occasionally they take over an Osprey nest. They feed on Tammar wallabies, resting and nesting seabirds (Wedge-tailed Shearwater, Roseate Tern, Common Noddy and Red-tailed Tropicbird), fish (buffalo bream, chinaman, cobbler and rock cod), large lizards (*Egernia kingii* and *E. stokesii*) and carpet python (*Morelia spilota imbricata*). Most of their prey is torn up and eaten on the flattened tops of rigid shrubs, especially *Pittosporum phillyreoides*. As with Ospreys, the arrival of an intruding White-bellied Sea-Eagle instigates panic from roosting or nesting seabirds which rise in alarm, circle and then return (Johnstone & Storr 1998).

**Tytonidae**

*Tyto javanica delicatula* Eastern Barn Owl

Rare vagrant or passage migrant. One flushed by Johnstone from an unoccupied hut on Beacon Island on 13 August 1983. In south-western WA this species is mainly a visitor (mostly April to October).

**Alcedinidae**

*Todiramphus sanctus sanctus* Sacred Kingfisher

Rare passage migrant. Hall (1902) collected one of two birds on Pelsaert Island on 27 October 1899, and N. Kolichis saw one on West Wallabi Island on 5 August 1976 (pers. comm.). In south-western WA this species is a breeding visitor and passage migrant (leaving the colder parts of range between early February and mid-July and returning between late August and late October). Wintering mainly north of the Tropic of Capricorn including eastern Indonesia but also commonly wintering on west coast and Rottnest Island.

**Falconidae**

*Falco cenchroides cenchroides* Australian Kestrel (Nankeen Kestrel)

Scarce visitor. Reports of single birds on North, East Wallabi, West Wallabi and Pelsaert islands in February, April, June, August and November. On Wallabi Island they quarter and hover over the more sparsely vegetated dunes, presumably in search of lizards. One breeding report; Tarr (1949) observed a pair and a clutch of three eggs in the top bucket of a disused guano escalator on Pelsaert Island in spring 1948. The birds were said to be recent arrivals.

**Cacatuidae**

*Eolophus roseicapilla roseicapilla* Galah

Accidental visitor. Single birds and small flocks observed in the Wallabi Group after periods of strong easterlies.

*Cacatua sanguinea sanguinea* Little Corella

Accidental visitor. Single birds and small flocks occasionally observed in the Wallabi and Pelsaert Groups.

**Acanthizidae**

*Sericornis maculatus balstoni* Spotted Scrubwren (Fig. 71)

Common resident on East Wallabi and West Wallabi islands. Usually in pairs or small parties. Found in all

**Figure 71.** *Sericornis maculatus balstoni* Spotted Scrubwren – West Wallabi Island. Photo: K. Coate.

types of dense vegetation. Commonly entering fisherman's huts on West Wallabi. Breeding in June and July (? early August); clutch C/2 (13), C/3 (7). Nests are a globular or loosely woven or untidy dome 120–130 mm high x 100–120 mm wide with a circular side entrance 30–40 mm in diameter; made of grass, bark, rootlets or fine twigs, lined with feathers and placed close to ground in a bush or low shrub. This subspecies is endemic to WA and occurs on coasts of Shark Bay region, north to Carnarvon and including Bernier, Dorre and Dirk Hartog islands, Peron Peninsula and Edel Land; south to Zuytdorp Cliffs; east to Woodleigh and Nerren Nerren and including the Houtman Abrolhos. It differs markedly from populations on the opposite mainland in being smaller and having paler spots on throat and breast (Johnstone & Storr 2004).

**Campephagidae**

*Coracina novaehollandiae melanops* Black-faced Cuckoo-shrike

Uncommon passage migrant. Four observed by R.I.T. Prince in early August 1976 (pers. comm.); and ones and twos observed by G.M. Storr on East Wallabi and West Wallabi islands in April, June and September 1959 (Storr 1965). In south-western WA this species is a resident, breeding visitor, winter visitor and passage migrant with southern birds (especially immatures) moving north from mid-January to early June and returning from late July to early November.

*Lalage tricolor* White-winged Triller

Accidental or irregular visitor. One observed by Coate on Pelsaert Island and one on Alexander Island in December 1996; and single birds observed by Johnstone and Coate on

Pelsaert, Alexander and Leo islands in December 2007. In south-western WA this species is an irregular visitor (all months but mostly late August to February).

### Pachycephalidae

*Pachycephala rufiventris rufiventris* Rufous Whistler

Rare vagrant. A female observed by Serventy and others on West Wallabi Island on 10 December 1963 (G.M. Storr & R.E. Johnstone, unpublished data).

### Rhipiduridae

*Rhipidura leucophrys leucophrys* Willie Wagtail

Rare vagrant or passage migrant. Four birds observed by R.I.T. Prince on North Island on 2 August 1976 (pers. comm.), and one observed by Johnstone on North Island on 14 August 1983, and one on Beacon Island in late May 1985.

### Corvidae

*Corvus coronoides perplexus* Australian Raven

Rare vagrant. Two observed by P. Griffin on Burton Island in late April 1976 (Storr *et al*. 1986). Also, two 'crows' reported by a fisherman in the Wallabi Group following offshore winds. (G.M. Storr & R.E. Johnstone, unpublished data).

### Petroicidae

*Petroica goodenovii* Red-capped Robin

Rare vagrant. Hall (1902) collected a young bird on Pelsaert Island on 27 October 1899. On mainland in south-western WA this species is partly migratory, some birds moving towards the west coast in late summer and early autumn.

### Hirundinidae

*Cheramoeca leucosterna* White-backed Swallow

Rare visitor. On 8 May 1981 Johnstone found seven old nest burrows in a blown-out dune on North Island. Two nest chambers were excavated and found to contain well-made nests of rootlets and strips of bark, but there was no evidence that the birds had laid or reared young.

*Hirundo neoxena* Welcome Swallow (Fig. 72)

Common resident throughout the Houtman Abrolhos. Breeding reported on North, Pigeon, West Wallabi, Leo, Wooded, Nook, Post Office and Pelsaert islands; from early August to mid-December; clutch C/3 (3). The nests are placed under overhanging limestone, eaves of buildings and

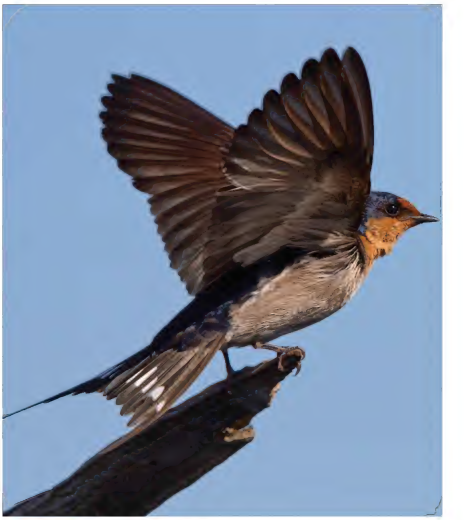

**Figure 72.** *Hirundo neoxena* Welcome Swallow. Photo: K. Lightbody.

under jetties. This species became established on North Island after 1945 as there were no buildings and very few other nest sites before 1946. Also recorded over East Wallabi, Pelican, Seagull, Lumley, Little Pigeon, Long, Beacon, Saville-Kent, Little North, Rat, Bushby, Little Rat, Alexander, Morley, Suomi, Burton, Basile, Newman, Gun, Murray and Jubilee islands (Johnstone & Storr 2004; Coate & Johnstone 2007, unpublished data).

## Locustellidae

*Poodytes gramineus gramineus* Little Grassbird

Rare vagrant. One heard and observed by Fuller near mangroves on Pelsaert Island on 17 February 1978 (Fuller & Burbidge 1981).

*Cincloramphus cruralis* Brown Songlark

Rare vagrant or passage migrant. Storr (1960) observed three singing males over the grassy central plain of North Island on 5 September 1959. In south-western WA this species is a migrant, arriving in May–September and leaving in November–February.

*Cincloramphus mathewsi* Rufous Songlark

Rare vagrant or passage migrant. Hall (1902) collected one of three birds in mangroves on Pelsaert I. on 27 October 1899. In south-western WA this species is a migrant, arriving in August–September and leaving in December–February with some birds occasionally remaining in autumn and winter.

## Zosteropidae

*Zosterops lateralis chloronotus* Grey-breasted White-eye (Silvereye) (Fig. 73)

Common resident, usually in small flocks (up to 40). Favours the taller and denser vegetation (*Avicennia*, *Nitraria*, *Myoporum*) but also visiting *Atriplex* and other low shrubs. Breeding reported from East Wallabi, Little Pigeon, Long and Rat islands, an islet near Newman Island, and Burton, Post Office, Sid Liddon (Six) and Pelsaert islands; early August to mid-November; clutch C/1 (2), C/3 (1), C/4 (1) and C/6 (1). Hall (1902) described a remarkable nest made of seaweed and located almost on the ground in a pigface *Carpobrotus*. This species has also been reported from North, Pigeon, West Wallabi, Tattler, East Mangrove, Beacon, Traitors, Eastern, Far, Seal, Little Rat, Roma, Alexander, Serventy, Suomi, Keru, Morley, Wooded, Helms, White, Leo, Hummock, Dry, Jackson, Coronation, Uncle Margie, Gun, Murray, Three, Sid Liddon (Six), Eight, Sandy, Square, Rotondella, Stick and Middle islands. On West Wallabi Island regularly drinking from rain water tanks.

**Figure 73.** *Zosterops lateralis chloronotus* Grey-breasted White-eye drinking from water tank. Photo: K. Coate.

Surman listed the Yellow White-eye for Gun Island (Surman & Nicholson 2015) – an obvious error for Grey-

breasted White-eye. In WA, the Yellow White-eye ranges south to Peron Peninsula, Shark Bay.

### Motacillidae

*Anthus australis australis* Australian Pipit

Moderately common resident on North Island. It has been recorded by all visiting ornithologists to North Island beginning with Alexander in November 1913 (G.M. Storr & R.E. Johnstone, unpublished data). Usually single, occasionally in twos. Favours open areas; beaches, dunes, the airstrip and around the salt lake. Display flights were observed by Johnstone on 14 August 1983. Between 22 March 2018 and 23 June 2020 ten cameras were deployed in relatively open areas across North Island to detect the Abrolhos Painted Buttonquail. Nine out of the ten cameras detected the Australian Pipit with 109 separate detections for the period they were deployed Davis *et al.* (2020). It is noteworthy that no Australian Pipit records were captured using the same number of cameras for the same period on East Wallabi Island.

It is a rare vagrant to other islands: one observed by Johnstone on East Wallabi Island airstrip on 8 May and 6 October 1981, and one collected by Helms (1902) on Gun Island in 1898.

## Discussion

A total of 105 species (91 non-passerine and 14 passerine) have been recorded from the islands and adjacent seas. This includes 40 species of seabirds, 21 species of migratory shorebirds, 3 resident shorebirds and 41 species of littoral and land birds.

### Seabirds

The Houtman Abrolhos is host to the largest breeding colonies in WA of 11 species of seabirds: Wedge-tailed Shearwater, Little Shearwater, White-faced Storm Petrel, White-bellied Sea-Eagle, Eastern Osprey, Common Noddy, Lesser Noddy, Caspian Tern, Crested Tern, Roseate Tern and Fairy Tern. Of these, the Lesser Noddy is found nowhere else in Australia and two species, the Little Shearwater and Fairy Tern, are declining in much of their range in WA. Four species of tropical seabird have spread southwards since colonial times, namely the Wedge-tailed Shearwater, Red-tailed Tropicbird, Roseate Tern and Bridled Tern (Fig. 74). This spread and continuing increase in numbers have been attributed to the strengthening of the south-flowing Leeuwin Current (Johnstone & Storr 1998). This current brings warm, low-salinity, low-nutrient, tropical water from the western Pacific Ocean, via the Indonesian Archipelago and Timor Sea, down the outer continental rim of WA and around Cape Leeuwin (Pearce & Cresswell 1985; Pearce & Walker 1991). The Leeuwin Current varies in strength seasonally and from year to year correlated to some extent with the Southern Oscillation Index (SOI). This variation greatly affects the Houtman Abrolhos (Pearce 1997) and has a marked impact on islands off the far north-west coast including Ashmore Reef and islands off the southern parts of the west coast. This explains the presence of many tropical seabirds much further south in WA than off the east coast of Australia. The Leeuwin Current is stronger in years with negative SOI values, e.g. with the severe El Niño of 1997 to mid-1998 its strength declined dramatically.

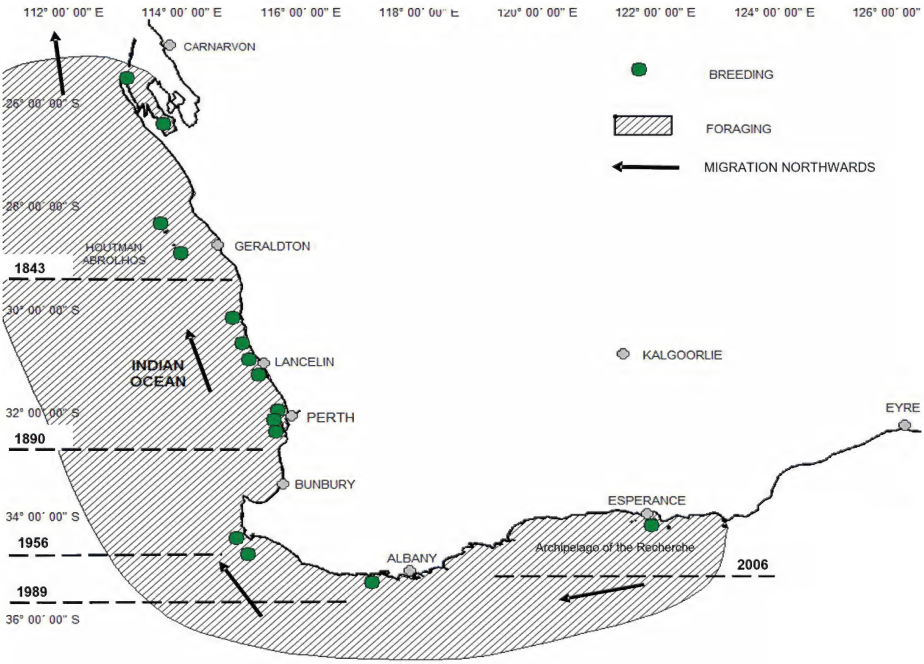


**Figure 74.** Distribution and migration map of Bridled Tern showing expansion southwards.

Detailed studies (Gaughan *et al.* 2002; Surman & Wooller 2003) at the Houtman Abrolhos give information on the foraging range and food of five terns (Crested, Roseate and Sooty Terns and Common and Lesser Noddy) and on the timing of breeding events and breeding success in the 1990s. Their results suggest that in negative SOI years, some species are greatly affected by the strength of the Leeuwin Current, e.g. in 1997 when there was a delay in breeding and subsequent failure of Wedge-tailed Shearwater and Common Noddy colonies. Both these species forage well to the west of the islands and depend on prey that are affected by the Leeuwin Current. Species that forage in inshore waters, e.g. Crested Tern, were not affected.

Also noteworthy was the marine heat wave off WA during the summer of 2010–2011. Water temperatures off the south-western coast of WA rose to unprecedented levels during February and March 2011, and this warming event was termed a marine heat wave. This heat wave coincided with an extremely strong La Niña event and a record strength Leeuwin Current. The resulting spike in water temperatures (an increase of 2–3°C over a few days, also associated with calm still conditions) caused large fish kills at the Abrolhos and along the mid-west coast from Green Head to Moore River. This and future events may well have an impact on species that forage in inshore waters (Pearce *et al.* 2011).

The Houtman Abrolhos are world

famous for their breeding tropical seabirds. Four species breed in vast numbers, namely the Wedge-tailed Shearwater, Lesser Noddy, Common Noddy and Sooty Tern. The Common Noddy and Sooty Tern are found in tropical seas throughout the world; the shearwater is widespread in the Indian and Pacific oceans, but the Lesser Noddy is confined to minute parts of the Indian Ocean with one subspecies in the Seychelles and one in the Houtman Abrolhos. Of note, on the southern end of Pelsaert Island there are three tiers of tropical seabird species nesting in large numbers at the same time – Wedge-tailed Shearwater in burrows below the ground, Sooty Tern in scrapes on the ground beneath bushes and Common Noddy on tops of bushes above the ground (Johnstone & Storr 1998).

The Roseate Tern is another tropical species that favours blue water seas close to land (especially around islands). It is threatened in the United Kingdom and parts of the United States, but has been expanding its breeding range southwards in WA since the 1890s. Autumn-winter breeders evidently colonised the Abrolhos in the 1890s and the lower west coast islands in the 1950s. Spring-summer breeders (already numerous in the Abrolhos by 1843) colonised the lower west coast islands around 1960 (Johnstone & Storr 1998). Huge numbers (flocks of up to 50,000) of the southern subspecies *Sterna dougallii gracilis* recorded in the Pilbara are highly likely to be passage migrants moving north from the south-west including the Abrolhos and central west coast. It is now known that individuals of the northern subspecies *S. d. bangsi* that breeds in temperate Asia to the south-west Pacific are recent colonists to the Kimberley and Pilbara and could continue to expand southwards (Johnstone *et al.* 2013).

The Fairy Tern is essentially another blue water tern favouring sheltered inshore waters. Although it appears to be largely resident in the Abrolhos, elsewhere in south-western WA it is a visitor mid-August to early June to other west coast islands and sheltered seas, estuaries (when free of silt) and near-coastal lakes. Numbers in the Gascoyne and Pilbara are augmented by winter visitors from the south and no doubt include some Abrolhos birds. It appears to be decreasing in abundance in the Pilbara and declining elsewhere in Australia and this could be partly attributed to direct competition with the Little Tern and reduced breeding success because of beach developments. On the other hand, in WA the White-shafted Little Tern appears to be increasing in abundance as a breeding bird in the Kimberley and Pilbara and is continuing to spread southwards like other tropical terns (Wooller *et al.* 1991). The Lesser Crested Tern is another tropical species that is apparently increasing in numbers and expanding its breeding range south on the west coast to Dirk Hartog Island (Johnstone *et al.* 2000) and will almost certainly colonise the Abrolhos in future years.

The Abrolhos is also home to another category of seabirds which occur in warm temperate as well as tropical seas. Eleven such species breed on the Abrolhos: Pied Cormorant, Red-tailed Tropicbird, Eastern Reef Heron, White-bellied Sea-Eagle, Eastern Osprey, Silver Gull, Caspian Tern, Crested Tern, Roseate Tern, Bridled Tern and Fairy Tern. The Pied Cormorant breeds as far south as The Sisters (near Penguin Island) and this is one subtropical

seabird that has been unable to extend its breeding range southwards since colonial times. The White-bellied Sea-Eagle is very common in the Abrolhos but scarce or uncommon about the west coast between Beagle Island and Edward Island (near Lancelin) and on the south coast east of Albany, and rare or absent elsewhere in south-western WA, highlighting the importance of the Abrolhos for this species. The same applies to the Eastern Osprey that is very common in most of the Houtman Abrolhos and on islands about the west coast of WA from Beagle Island south to Edward Island but scarce or uncommon elsewhere in south-western WA.

The islands are very important breeding grounds for the Eastern Reef Heron, Pacific Gull and Bridled Tern. The Bridled Tern is essentially a blue-water tern typically foraging well offshore, usually in ones and twos occasionally in small groups and less frequently in larger aggregations of hundreds during migration at food-rich sites. In WA virtually all populations leave Australian seas in cooler months and winter north of the Equator in the seas off Sulawesi and the Philippines. The breeding range of the Pacific Gull terminates in the Shark Bay region and there are two other species of warm temperate seabirds that breed no further north than the Abrolhos – the Little Shearwater and White-faced Storm Petrel.

Based on the vast number of individuals present on the Houtman Abrolhos, the islands are seen to be overwhelmingly a home for tropical seabirds. The absence of Boobies is rather surprising considering the breeding of the Masked Booby on Lord Howe Island (31°28'S) off eastern Australia, whereas in WA this species only breeds south to Bedout Island (19°35'S) off the Pilbara coast.

**Seabird Breeding Seasons**

In the Houtman Abrolhos most breeding (about 90%) takes place in the spring (sometimes including late winter or early summer). This is in contrast to much of WA where autumn is the most important breeding season. On the Abrolhos spring breeders include the Wedge-tailed Shearwater, Red-tailed Tropicbird, Pied Cormorant (in contrast to further north and south, where breeding occurs only or mainly in autumn-winter), Eastern Reef Heron, Osprey, Pacific Gull, Common Noddy, Lesser Noddy, Caspian Tern, Bridled Tern, Sooty Tern and Fairy Tern. There are two winter breeders – the Little Shearwater and White-bellied Sea-Eagle. None of the seabirds lay solely in autumn, however, the Silver Gull nests continuously from autumn to spring, and Crested and Roseate Tern nest in autumn and again in spring and early summer. There appears to be a peak in small schooling clupeid and atherinid fish numbers during spring-summer providing a good food supply during that period. Conversely there appears to be an inadequate food supply for supporting large populations of seabirds in the autumn-winter. The Wedge-tailed Shearwater, White-faced Storm Petrel, Common Noddy, Sooty Tern and Bridled Tern almost entirely leave the area in the autumn indicating an inadequate food supply during this period. Reduced breeding and increased breeding failure of tropical pelagic seabirds has occurred at the Houtman Abrolhos during strong El Niño-Southern Oscillation events (Pearce 1997). Species impacted by these events

include the Wedge-tailed Shearwater, Sooty Tern, Brown Noddy, Lesser Noddy and the Little Shearwater.

### Land Birds

Three species of shorebird breed in the Abrolhos, namely the Pied and Sooty Oystercatchers and the Red-capped Plover. The Pied Oystercatcher is most numerous on the largest islands and favours the sandy beaches. The Sooty Oystercatcher favours the rocky coasts and seaweed-strewn beaches. There are 21 Palaearctic species including the Grey Plover, Bar-tailed Godwit, Grey-tailed Tattler, Ruddy Turnstone, Red-necked Stint and Curlew Sandpiper visit the islands during the southern summer. A number of islands, especially those with mangroves, are notable for their large numbers of Spotless Crakes.

Only six species of land bird are resident on the Abrolhos namely: the Abrolhos Painted Buttonquail, Brush Bronzewing, Welcome Swallow, Australian Pipit, Spotted Scrubwren and Grey-breasted White-eye. Of these the conservation of the Buttonquail is of most concern. It is found on East Wallabi, West Wallabi and adjacent islands including Seagull, Oystercatcher and Turnstone, but is apparently extinct on North Island where they were common. Its demise on North Island is likely the result of habitat destruction following the introduction of the Tammar and possibly the effect of fire and the introduced house mouse. Its conservation on the Wallabi Group is now very important in view of its extinction on North Island. The mainland subspecies *Turnix varius varius* ranges north on the mainland to the lower Murchison with isolated populations at Shark Bay (Denham) and on Dirk Hartog Island. Of interest is the fact that the Australian Pipit has survived the habitat destruction on North Island.

The Brush Bronzewing is scarce and patchily distributed on the mainland north to Freshwater Point and the Abrolhos population is the northernmost in WA.

## Vulnerability of the Birds

### Climate Change

As with many small islands in the Indian Ocean, most are vulnerable to the effects of climate change. A number of islands in the Abrolhos are potentially threatened by a combination of human pressures, climate change and sea level rise, increases in sea surface temperature, and possible increases in extreme weather events. Future impacts on low-lying islands will include changes in island geomorphology, through accelerated coastal erosion, impacts of sedimentation in the island lagoons and embayments and increased flooding from both the sea and storm surge. Species more likely to be susceptible to the impacts of climate change include the Lesser Noddy and the burrowing seabirds: Wedge-tailed Shearwater, Little Shearwater and White-faced Storm Petrel. High intensity cyclones could cause extensive loss of mangroves which are an important breeding habitat for the Lesser Noddy and flooding of sandy low-lying areas could affect the burrowing species. The Lesser Noddy relies on the mangroves for breeding and there are few opportunities for dispersal and recolonisation beyond the patches of mangal on a small number of islands and thus a very restricted area of breeding habitat.

Seabirds are entirely dependent on the ocean for food so any significant change to currents and sea surface temperature from projected climate change could alter seabird breeding success.

The islands are also important for migratory shorebirds with 20 species recorded including Greater Sand Plover, Bar-tailed Godwit, Black-tailed Godwit, Ruddy Turnstone, Great Knot, Curlew Sandpiper and Grey-tailed Tattler.

## Habitat degradation rehabilitation of North Island

Many of the islands have been greatly disturbed as a result of historical wreck survivor camps, guano mining, oil exploration, introduction of feral species (rats, cats, tammar, house mice, weeds), commercial fishing activities, building of airstrips, human visitor activities, fires and cyclones. Of these by far the worst was the introduced black rats and feral cats. In 1846 rats were recorded on Rat Island by Cmdr Lort Stokes who named the island (Stokes 1846) and were most likely survivors from a shipwreck. By the end of the 1930s over 1.5 million terns and probably over a million shearwaters had disappeared from Rat Island due to rats, cats and guano mining. The recent loss of the Abrolhos Painted Buttonquail from North Island in the past 10 years due to the introduced Tammar is also disturbing and efforts to eradicate the Tammar and allow for recolonisation (or introduction from West Wallabi) of the quail should occur.

## Oil Spills and Fire

The spillage of oil, either from tankers or local drilling, constitutes a threat to birds that forage in the shallows and along shores, through the fouling of plumage and destruction of food supply. It could also pose a threat to the stands of mangrove that are important breeding sites for the Lesser Noddy that nest solely in these trees. Some land-locked stands of mangal in the Mangrove Group (within the Pelsaert Group) are the least vulnerable as they grow in land-locked lagoons. These areas should have a high conservation priority in the event of destruction of mangroves elsewhere.

Wedge-tailed Shearwaters migrate north-west into the central Indian Ocean, on both sides of the Ninety East Ridge that is also a major foraging area for a number of migratory seabirds from the tropical western Indian Ocean. This Middle East-Australia maritime line region has a very high risk of accidental marine pollution (particularly through oil spills) as it is also the wintering area of several seabird species from the eastern Indian Ocean. Oil spills generate large surfaces of oil that drift over days or weeks throughout the ocean, generating pollution far from the place of oil release. Local populations of four species of seabirds of the Persian Gulf suffered severe mortality (22–50%) during the massive oil spill provoked deliberately by Saddam Hussein during the Gulf War in 1991 (Evans *et al.* 1993).

Fire is an additional danger that could greatly alter the area and quality of the vegetation. The vegetation of North Island is especially flammable, as testified by past fires and the consequent of blowing-out of dunes.

## Silver Gulls

Silver Gulls have expanded in response to food supplementation on inhabited

islands. Silver Gulls predate on eggs and nestlings of other surface-nesting seabirds. Despite the increased food provided by the fishing industry, Silver Gull numbers are not high enough to seriously affect surface nesting seabirds. This is no doubt due to the fact that the islands are uninhabited for most of the year. The establishment of year-round tourism could result in a large increase in gull numbers.

### Visitor impacts

The impact of human disturbance on breeding seabirds is not known but there has been a significant increase in visitors to islands with popular anchorages including Wooded, Leo and Pelsaert islands. It is assumed that the forthcoming Houtman Abrolhos draft management plan will provide the management of tourism opportunities and a code of conduct for visitors.

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## Appendix 1 – Etymology of some island names

During the course of fieldwork on the Houtman Abrolhos in the early 1980s, R.E. Johnstone became aware that a number of important islands were unnamed. Following a submission and discussions with the Nomenclature Section, Lands and Survey Department, Perth a number of names were approved. These are as follows:

### Wallabi Group

Turnstone Island 28°26′50″S, 113°43′08″E

Named after the Ruddy Turnstone *Arenaria interpres* which occurs on the island.

Oystercatcher Island 28°27′30″S, 113°43′E

Named after the Pied and Sooty Oystercatchers (*Haematopus longirostris* and *Haematopus fuliginosus*, respectively), which occur on the island.

Hall Island 28°28′10″S, 113°48′35″E

Named after Robert Hall, an ornithologist who visited the Abrolhos in 1899.

Saville-Kent Island 28°28′15″S, 113°48′30″E

Named after William Saville-Kent who was Commissioner and Inspector of Fisheries to the Western Australian Government from 1893–1895.

Dakin Island 28°28′30″S, 113°48′22″E

Named after William John Dakin, naturalist and leader of the Percy Sladen Trust Expeditions to the Abrolhos Islands in 1917.

### Easter Group

Gilbert Island 28°39′50″S, 113°49′30″E

Named after John Gilbert, the famous naturalist and collector, who visited the Abrolhos in 1843.

Alexander Island 28°40′25″S, 113°49′30″E

Named after Wilfred Backhouse Alexander, former naturalist with the WA Museum, who was responsible for much of the early work on WA seabirds, including (with Dakin) those of the Abrolhos.

Serventy Island 28°41′00″S, 113°49′40″E

Named after Dr Dominic Louis Serventy and Mr Vincent Noel Serventy, ornithologists who have published a great deal on WA seabirds, including those of the Abrolhos.

Gibson Island 28°41′S, 113°49′20″E

Named after Charles George Gibson, Government Geologist and naturalist who visited the Abrolhos in 1907.

Campbell Island 28°41′40″S, 113°49′38″E

Named after Archibald James Campbell, famous Victorian ornithologist who visited the Abrolhos in 1889.

Bynoe Island 28°39′50″S, 113°52′15″E

Named after Benjamin Bynoe, assistant surgeon and naturalist on the HMS *Beagle* that visited the Houtman Abrolhos in 1840.

Helms Island 28°40′S, 113°51′30″E

Named after Richard Helms, a biologist who visited the Abrolhos in 1897 and 1901.

Stokes Island 28°40′30″S, 113°50′46″E

Named after John Lort Stokes (Admiral), who was commander of HMS *Beagle*.

Shearwater Island 28°43′50″S, 113°49′05″E

Named after the Little Shearwater (*Puffinus assimilis*) which breeds on the island.

Crake Island 28°44′30″S, 113°49′45″E

Named after the Spotless Crake (*Zapornia tabuensis*) which occurs on the island.

**Pelsaert Group**

Wader Lagoon, Pelsaert Island 28°56′S, 113°58′05″E

Named after the large numbers of wading birds that feed and roost around the lagoon.

A further four unnamed islands were given provisional names by K.H. Coate during the *Landscope* 1999 Expedition and these were forwarded to Department of Land Administration.

**Wallabi Group**

Unnamed islands north of First Sister Island.

"Naturalist Island" 28°28′32″S, 113°44′39″E

Named after those who assisted in the survey on the *1999 Landscope* Expedition

"Tectus Island" 28°28′27″S, 113°44′38″E

Named after *Tectus pyramis* one of the species of broken shells dropped for food by Pacific Gulls.

**Easter Group**

Unnamed islands east of Tapani Island.

"Nitraria Island" 28°40′27″S, 113°51′28″E

Named after the dense vegetation on the east end.

"Landscope Island" 28°40′22″S, 113°51′30″E

Named after the *1999 Landscope* Expedition survey.

## Appendix 2 – List of the Houtman Abrolhos islands

Listed below are names of islands referred to in the text. Officially named islands in Roman, unofficially named islands in *italics.* Note that there are two Sandy Islands (one in Easter Group, the other in Pelsaert Group) and two islands called Shag Rock in the Wallabi Group (only one is officially named).

### EASTER GROUP

'*Beacon Rock*' near Rat I
Alexander
Bushby
Bynoe (Eastern Islands)
Campbell
Crake
Disappearing
Dry
Gibson
Gilbert
Helms (Eastern Islands)
Joe Smith (Eastern Islands)
Keru
Landscope
Leo (Eastern Islands)
Little North (Eastern Islands)
Little Rat
Little Roma
Little Stokes
Morley
Nitraria
Rat
Roma
Sandy
Serventy
Shearwater
Stokes (Eastern Islands)
Suomi
Tapani (Eastern Islands)
White (Eastern Islands)
White Bank
Wooded

### PELSAERT GROUP

Arthur
Basile (Mangrove Group)
Burnett
Burton (Mangrove Group)
Coronation (Mangrove Group)
Davis (Numbered Islands) formerly Five Island
Diver (Mangrove Group)
Eight (Numbered Islands)
Foale (Mangrove Group)
Gaze (Mangrove Group)
Gregory
Gun
Hummock
Iris Refuge (Mangrove Group)
Jackson (Mangrove Group)
Jackson
Jon Jim
Lagoon (Mangrove Group)
*Little Jackson* (Mangrove Group)
Middle
Murray
Newbold (Mangrove Group)
Newman (Mangrove Group)
Nook (Mangrove Group)
One (Numbered Islands)
Pelsaert
Post Office (Mangrove Group)
Robertson (Mangrove Group)
Rotondella (Mangrove Group)
Sandy
Seven (Numbered Islands)
Ship Rock
Sid Liddon (Numbered Islands) formerly Six Island
Square
Stick
Sweet (Numbered Islands) formerly Four Island.
The Coral Patches (13 islets)
Three (Numbered Islands)
Travia (Mangrove Group)
Two (Numbered Islands)
Uncle Margie (Mangrove Group)

**WALLABI GROUP**

Akerstrom
Alcatraz
Barge Rock
Beacon
Dakin
Dick
East Wallabi
Eastern
Far
First Sister
Hall
Helms
Little Pigeon
Long
Lumley
Marinula
Naturalist
North
Oystercatcher
Pelican
Pigeon
Plover
Saville-Kent
Seagull
Seal
Second Sister
Shag Rock
Shag Rock (off North Island)
Tattler
Tectus
Third Sister
Traitors
Turnstone
Wann
West Wallabi

## From Field and Study

# Mistletoes in mangroves in Western Australia

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Mistletoes are hemiparasitic stem parasites. That is, they obtain water and mineral nutrients from their host's stems by tapping into its xylem with a specialised structure called a haustorium. However, they are well supplied with chlorophyll in their leaves (usually) or in their stems (sometimes), and can photosynthesise their own carbohydrates.

In Western Australia (WA), mistletoes can infect a wide variety of hosts including, for example, members of the Myrtaceae (especially *Eucalyptus, Corymbia* and *Melaleuca*) and the Fabaceae (especially *Acacia*). However, several species are very host specific (Start & Thiele 2023). Two of those are mangrove specialists, *Amyema thalassia* (Barlow) growing, in WA, on *Avicennia marina* (Forssk.) Vierh and *A. mackayensis* (Blakely) Danser growing on species in the Rhizophoraceae. Both mistletoe species occur in mangroves from the Kimberley and the Northern Territory (NT) to Queensland, where there is a third mangrove specialist, *Lysiana maritima* Barlow, which also occurs on the coast of Gulf of Carpentaria in the NT (Moss & Kendall 2016) but has not been recorded in WA.

While collecting mistletoes in the Kimberley in 2014, Joff and Joan Start, found a mistletoe, growing on *Excoecaria ovalis* Endl. (Euphorbiaceae) in a mangal community at Wyndham (Fig. 1). The collection of another species of mistletoe from a mangrove host, in the North Kimberley, prompted me to review the occurrence of mistletoes in WA mangroves. The Wyndham specimen had one damaged fruit, which was not diagnostic. However, the leaves were typical of *A. dolichopoda* Barlow, a Kimberley endemic (Fig. 2) (Start & Thiele 2023). In February 2015, Tricia Handasyde

**Figure 1.** *Amyema dolichopoda* (in circle) growing on *Excoecaria ovalis* in a mangrove community at Wyndham. Photo: T. Handasyde.

**Figure 2.** The original plant of *A. dolichopoda* discovered by Joff and Joan Start at Wyndham. Photo: J.D. and M.J. Start.

revisited the site and collected and photographed the mistletoe, the specimen is now in the collection of the WA Herbarium (Number PERTH 08828407) enabling me to confirm it was *A. dolichopoda*.

*Amyema dolichopoda* Barlow is widespread in the Kimberley. Start and Thiele (2023) record hosts from seven families but none in the Euphorbiaceae. It is particularly common near Wyndham where it infects a variety of hosts, notably species of *Acacia*, but I know of no other host records from families with species that grow in mangal communities. It is not known whether *E. ovalis* takes up salt as do some other mangrove species including *A. marina,* which has moderately high levels of salt in its sap (Semeniuk *et al.* 1978).

Because *A. thalassia* obtains its water from its host's sap, it takes in some salt and both mistletoe, and its host end up with salt in their leaves. It is often difficult to dry specimens of this mistletoe in a plant press because the salt in the leaves retains moisture and specimens shed their leaves in the press, resulting in specimens that are often no more than a collection of loose leaves and bare twigs. Indeed, there may be so much salt in some leaves that the salt crystals that form as the leaf dries, blister and rupture the epidermis. *A. marina* can reduce its salt load by either shedding salt-laden leaves or excreting some of the excess salt from glands in their leaves (Drennan & Pammenter 1982). Moss and Kendall (2016) note that in Queensland the mistletoe *Amyema mackayensis* growing on *A. marina* also accumulates salt in its leaves and like its mangrove host it can also reduce its salt load by shedding leaves.

On 8 May 2016, at low tide, I noted numerous leaves of *A. thalassia* and *A. marina* on the mud below a stand of mangroves a little west of the Broome Bird Observatory (17° 38′17″ 38′1″S, 122° 20′ 1″E), suggesting, that like its host and *A. mackayensis*, *A. thalassia* can shed leaves to reduce excessive salt loads.

## Acknowledgements

I am grateful to Joan and Joff Start and Tricia Handasyde for collecting and photographing the mistletoe at Wyndham for me. I also acknowledge Norm McKenzie who facilitated me being near Broome in 2016.

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## Tribute to Ernie Laidlaw

# *Arid Shrubland Plants of Western Australia* – a bit of history

In October 2022, several members of the Naturalists' Club joined an excursion from Perth to the East Pilbara including a visit to the Karlamilyi National Park (formerly known as the Rudall River National Park), located between the Great Sandy and Little Sandy Deserts.

Among the reference books on board was the second edition of *Arid Shrubland Plants of Western Australia.*

The first edition of the publication, then referenced as *Plants of the Arid Shrublands of Western Australia*, A.A. Mitchell, D.G. Wilcox with photographs by E. Laidlaw, was produced in 1988 by University of WA Press and Western Australian Department of Agriculture.

Long-time employee of the WA Department of Agriculture, Ernie Laidlaw, died on 5th December 2022 after a very short illness. Ernie was not a trained botanist but as a keen photographer he made a major contribution to the recording of the state's arid plants.

With the kind permission of his wife Pat, we can reveal the history of this publication.

In the early 1980's over about a 6-year period whenever Andy Mitchell and Ernie could make time together and the time was right for the plants to be in flower or seed etc., they would head out from Meekatharra in a station wagon piled high with

Photo of authors on back cover of second edition. Left to right: E. Laidlaw, A.A. Mitchell, D.G. Wilcox.

supplies and tyres to gather more photographs and samples for the book. The pastoralists in the region would contact Andy if they found samples of unidentified and sometimes just different plants and with these contacts, they would plan their route as the plants had to be photographed in situ.

Our daughter, Gemma, was born in September 1980 and for a large part of her early years Gemma and I would be plotting where her father was, on a huge map of Western Australia. I believe now, that's how Gemma came to be interested in the country – because her daddy was always there!

The first edition of the book was aimed at pastoralists and farmers and the book was small and sturdy enough to put in their car glove box. To the surprise of both UWA and the Department of Agriculture, it became a best seller with pastoralists buying multiple copies for different vehicles. The mining industry was also a big buyer as the details about the plants were ideal for restoration projects. The second edition was thus made possible by the support of many mining companies.

The second edition came out in 1994. I had to have a chuckle. All the time the two fellas were doing the research and photos for the first book they lived on the scent of an oily rag and only the support (housing and feeding them) of the farmers / pastoralists really kept them going. This time the Department sent them out in a fully equipped 4WD with GPS, fridge, telephone – you name it. The book also "grew" and became less of a glove box item and more of a bookshelf reference.

The title was changed for the second edition – I never worked out why.

A revised edition of *Arid Shrubland Plants of Western Australia* is currently in production and will be available in 2023. UWA Publishing describes the book on their website as:

> *An important resource for pastoralists, mining companies, geologists, shire councils and native tree growers, and will also appeal to travellers and lovers of the Australian bush.*

UWA Press at

https://uwap.uwa.edu.au/products/arid-shrubland-plants?variant=6858083331

**Don Poynton**

**Book review**

# Island Jewels: the Natural History of Western Australia's Islands

By Ian Abbott & Andrew Burbidge. *Leschenault Press, 2022.*

**ISBN: 978-1-9226706-4-9, $65**

It would take a very patient person to challenge the claim by the authors of this book that there are 3,576 islands along the Western Australian coastline. The exactness of this count is an indication of just how thorough the research was, for the publication.

*Island Jewels: the Natural History of Western Australia's Islands* is the work of two experienced wildlife scientists who each spent more than 50 years researching and reporting on the plants and animals of Western Australia. Much of this time, due to their passion for making new discoveries, was spent visiting both nearshore and remote islands, stretching from the tropical cays of Ashmore Reef (technically not in Western Australia), to the wind-swept rocks of the Archipelago of the Recherche along our rugged south coast.

It is very hard to imagine what more could have been included in the 365 pages that make up the 13 chapters and three appendices. The authors have chosen to treat the islands geographically rather than focusing each chapter on groups of species or insular characteristics or actual and potential threats to island life. Consequently, they have grouped the islands into ten regions: *Tropical Cays, Kimberley Islands* (with mention of the Naturalists' Club's trips to what is now known as Naturalist Island*), North-west Inshore Islands, North-west Offshore Islands, Islands of Gutharraguda (Shark Bay), Mid-west Inshore Islands, Houtman Abrolhos, Perth Region, South-west Corner Islands* and *Archipelago of the Recherche*.

Readers are taken through a consistent structure for each grouping commencing with an **Introduction** which covers Aboriginal history, European discovery and naming, and European history of visitation or occupation.

The second section deals with **Physical Characteristics** such as geology, geomorphology and climate. This is followed by **Biological Characteristics** where we get to learn, in considerable detail, about biological discoveries, vegetation and fauna. Depending on the region, the latter may include sub-sections on mammals, landbirds, seabirds, reptiles, frogs, land snails and even subterranean fauna, often with tables and graphs.

The fourth section of each regional chapter provides information on the ecology of some specific islands under the heading **Biological Attributes of Particular Islands**.

The chapter on each region then concludes with a discussion on the **Factors Leading to Change in the Biota**. Here we get to learn about natural factors such as droughts, the effect of salt spray and excess faeces buildup, as well as the devastation caused by human factors (e.g. guano mining or farming), and

the introduction of feral animals, particularly cats, rats, rabbits and goats. The authors also discuss the successes and failures of eradication efforts, attempts to restock some islands and the current island management.

The chapter on each region includes numerous photos, taken mostly by the authors, commencing in the early 1970s, and is completed by providing a list of the references used to support the information provided in each subsection. For brevity, just the author's(s') name and year of publication are provided, which then enables the reader to refer to the more complete reference in Appendix 3.

Members of the club will recognize the names of many fellow members among the references and in the breakout boxes which pay tribute to significant personality associated with islands. The latter include Glen Storr (various islands), Harry Butler (Barrow Island) and Elizabeth Rippey (Rottnest Island).

With the exception of the Tropical Cays, most of the islands only formed in the last 10,000 to 6,000 years as the result of rising sea level after the Last Glacial Maximum (LGM) about 20,000 to 18,000 years ago. This means most the islands were once part of the mainland and therefore their ecology could be expected to reflect that of their parent.

While Chapters 2–11 are dedicated to presenting the facts, in Chapter 12, *Similarities and Differences Between Regions in the Characteristics of Their Islands,* the authors integrate all this information and compare and contrast the physical, biological and aboriginal influences that have operated since the end of the LGM and offer reasons why many island flora and fauna differ, not only by region, but from island to nearby island as well as from the mainland. The authors consider factors that may play a role include area, maximum elevation and isolation but conclude much more research is needed.

The final chapter *Nature Conservation On Western Australian Islands* points out the global significance of our islands and their importance for current and future biodiversity conservation. However, it is inevitable that the number of islands will not remain static at 3,576 as "sea level rise will exacerbate inundation, amplify storm surge, and accelerate coastal erosion" (p. 306). Some low islands will disappear, and new ones will be created when elevated areas become surrounded by the encroaching sea.

The chapter concludes with a plea for more funding to conduct research, for improved biodiversity conservation status for our islands, and for a well-funded, scientifically-based management agency.

The authors wisely chose to use common names for species throughout the publication, where possible. For those wanting the scientific name it is simply a matter of cross-referencing the names in Appendix 1. Appendix 2 provides an explanation of "Unfamiliar Words".

There is so much information contained in these 13 chapters, readers may find it difficult to retain a lot of it. This is not a criticism of the book, just an indication of how much information it contains and why it will be a great addition to any member's bookshelf. In addition to naturalists, its contents will also appeal to historians, seafarers, adventurers and armchair travelers, alike.

The publication is not without fault, particularly for those readers who are not familiar with the vastness of our Western Australian coastline. No map should ever be printed without a scale! While Naturalists' Club members who read this book can visualize the distance, say between Cape Naturalist and Cape Leeuwin, a person referring to this map and the other 23 maps, are required to refer back to the very small scale-bar included with a map of the entire state, in the Introduction. The font size on most maps will require many readers to reach for a magnifying glass. It is accepted that it would be near impossible to label every island or islet mentioned in the book, but the absence of some referenced landmarks on the maps is an unfortunate omission. For instance, Cape Lambert is nominated as the eastern boundary of the Dampier Archipelago but does not appear on any map. Likewise, we are told, "From Port Hedland to Point Samson (200 km) there are just 15 islands" (p. 67), but the location of Point Samson is not shown and the lack of a scale-bar compounds the issue.

The authors are to be congratulated on making so much information available in one place and the locally based publisher, Leschenault Press, is commended for using its initiative to publish the book "print-on-demand" thereby keeping the Recommended Retail Price to a very reasonable and affordable $65.

**Don Poynton**